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PROBLEMS OF THE CONTINUATION SCHOOL

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Recent reports from the Federal Board of Vocational Education convey the information that eighteen states have passed laws providing for the establishment of compulsory part-time day continuation schools. Of these, one extends the compulsory attendance age to seventeen years, and ten to eighteen years of age. Only three of the states have fixed the required yearly minimum number of hours of compulsory attendance so low as the minimum fixed by the Federal Vocational Education Act.

The extension of the compulsory part-time provisions of the laws in so many states to include the older employes of sixteen to eighteen years, was thought by Dr. David Snedden, President of the National Society for Vocational Education, to suggest the importance of giving special consideration to the extent to which the continuation schools established under the laws in the various states can do work of a character which may properly be called "vocational." It was thought that this consideration might best be brought about by the work of a special committee thru a report to be presented by the committee at this session.

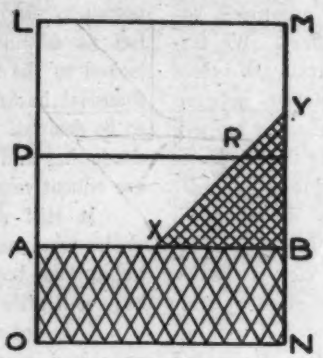

Fig. 1.

▭LMNO=Population of community.
AB=Age at which people may leave school.
AXY=Age at which people do leave school.
Shaded area=Section of population in full-time school attendance.
Unshaded area=Section of population for which part-time schools should be provided.

Dr. Snedden appointed the committee, but people are busy, and the country is large, and travel is expensive. It is difficult to get people to work together at great distances apart. After much travel and conference with Mr. Evans of Boston, Mr. John Callahan, state director of vocational education, Madison, Wisconsin, both members of the committee, and many other directors of vocational and of continuation schools thruout the country, it was decided that the chairman of the committee should attempt to make a helpful and suggestive presentation of the whole problem with which those called upon to promote, inaugurate, and conduct the continuation schools in the various communities are confronted. The "vocational" work will be discussed as one phase, and we hope, thus seen in its proper setting and logical relation. The presentation will attempt to show the place of the continuation school in the whole scheme of education, and to give some suggestions, born of experience, as to what the special problems are and how they may, at least in part, be met.

Let us first consider where the continuation school field lies with respect to the other educational activities of a state or community. To this end let us assume that the whole population of a state or community is represented by a rectangl as L M N O—Fig. 1.

If we draw the line A B as representing the earliest legal age at which young people are permitted to enter industry, the shaded portion below the line AB would represent, with the exception of those under the legal age for entering school, a section of the population in full time attendance at day school. If in addition we should draw the line X Y as representing the ages at which those young people leave school who do not leave at the earliest moment the law permits, we should have represented below the broken line A X Y the whole section of the population in attendance at full-time school. We should have there represented the whole section of the population which, economically, is being supported by some one else, and, on the whole, may be classed as dependents, whether they be in attendance at the kindergarten or the university, whether they be in public or private schools. It is an accepted policy that below the broken line A X Y schools shall be provided adequately, comprehensively, and at public expense. On the other hand, education in the field represented by the area above the broken line A X Y has never been felt to be a public responsibility except in a doubting, hesitating way and to an absurdly inadequate degree. The conviction that systematic, comprehensive, adequate educational tilling of this upper field at public expense, would pay economically, civically, and socially, and that a community cannot bankrupt itself doing things that pay in dollars and cents and in improved civic and social conditions, any more than a corporation or an individual can become bankrupt by doing things that pay in these respects, seems never to have been arrived at. We have, therefore, all seen

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this last mentioned field abandoned to the exploitation of the merely commercial institution, ranging all the way from reasonably good institutions to purely mercenary ones, sporadic efforts of purely philanthropic institutions and hopeless, inadequate extensions of public evening schools.

Just as we have failed below the line A X Y to realize that education pays so well, even in dollars and cents, that as good business men we cannot afford to invest less money in this field than it can profitably absorb, so above the line A X Y we have not all seen clearly the tremendous value of properly organized, administered and supported educational effort. We forget, if we ever knew it, that when we mention the values of things, we are merely stating a relation between things and people. Man is the only purchasing animal. Man, in the last analysis, is the only being that definitely confers values upon things. Uneducated, undeveloped people never increase wealth as do educated, developed people. The field above the line A X Y is our real great American Desert. It is rich in native fertility. It will yield when properly irrigated by education. Up to date we have scarcely favored it with an educational dew fall. Private parties have discovered a few water holes and fenced them in, and missionaries with a faith worthy of our emulation, "that whosoever shall give one of these to drink, shall in no wise lose his reward," are as ever found pioneering where needed work is to be done.

We have set forth the field above the line A X Y broadly, and at some length, because the continuation school, as it is conceived of in most states, is thus seen to be part of the work of the upper field. Let the compulsory continuation school be represented by that portion of the unshaded area below the dotted line P. R. Let us take things as they are for the purpose of our discussion, but recognize that the line A B may be moved up by legislation, carrying the line P R ahead of it. We shall then have as a constant compulsory continuation school problem educational contact with the youngest stratum of employed people, and all the difficulties and responsibilities that go with their initiation into trade, industry and commerce and their early development in those respective lines.

Above the line P R there is much in common with the continuation school problem. There is much that suggests that the education of that section of the population represented by the whole upper, unshaded portion of the rectangle should be organized and administered together, with such special adaptation of means to ends as will make success possible and even probable. What some of the differences are which suggest adaptation of administrative machinery, as well as matter and method, will appear in the discussion of the compulsory part-time work below the line P R.

Let us again, in order to get the attempted presentation clearly before us, assume in Fig. 2 that the rectangle A B C D represents the employed population of a community, between the ages of 14 and 16, or 17, years. That the line A B represents the conditions that must be met before young people are permitted to leave school and enter employment. That rectangles 6, 7, 8, and HS represent respective school grades from which young people enter employment. That the small dots represent 2,700 jobs of little or no opportunity except as any job is an opportunity for the exceptional young person. Let us assume that the 300 heavy dots represent jobs which are of such a character as will constitute unusual opportunity for any boy or girl who is not subnormal. Let us assume that the state, thru its agencies, has looked to the moral hazard, physical hazard, and even financial hazard, so that in these respects little is left to be desired. It still remains that the 2,700 jobs are deadening and de-educative in their effect, and the 300 are educative and stimulating.

It still remains that no exercise of wisdom of choice, and no amount of analysis, and no amount of helping one boy to beat another to it, can guide the 3,000 boys and girls into the 300 good jobs.

I do not wish to be thought to be arguing against organized placement work, nor the disseminating of vocational information. Placement work ought to be better supported than is usually the case, but its limitations must be recognized to the end that communities may not think they have done more than they have done, and be led not to forge ahead with the other very essential thing, viz., that of making adequate, comprehensive and public provision for part-time compulsory education, which part-time work must be shot thru with the idea of guidance while working.

The before mentioned 2,700 dead end jobs are going to be filled with 2,700 boys and girls, some of whom cannot be made "dead end" boys and girls, and who will succeed in spite of all unfavorable circumstances. For the vast majority such jobs will, by themselves, de-educate, de-vitalize, and degenerate, the young people, who, in their very formative years, by necessity or unwise choice find themselves thru several years occupying them. They are properly named "dead end" jobs.

Figure as we may, young people, in their first contact with industry, are in a large measure bound to occupy such jobs, and industry is constantly multiplying them. As to the initial placement of these young people, I am convinced that the young person's ultimate employment is not so much determined by the nature of the initial job he undertakes, as by the way such young person reacts in his or her initial job. I believe, and, in fact, I know from experience with thousands, that when the job is hooked up with the school as indicated in the preceding chart where S is intended to represent the school with lines extending from S to every job of the 3,000, the number of "dead end" situations are vastly diminished, and the "dead end" jobs cease to be the very great menace they otherwise constitute.

You will notice in Fig. 2 the good jobs—those that have an element of apprenticeship in them in the sense that they involve the young person, often unknown to himself, in a program, are connected with the school just as are the less promising ones. You will notice likewise no young people entering the field within the age of compulsory attendance are excused because of

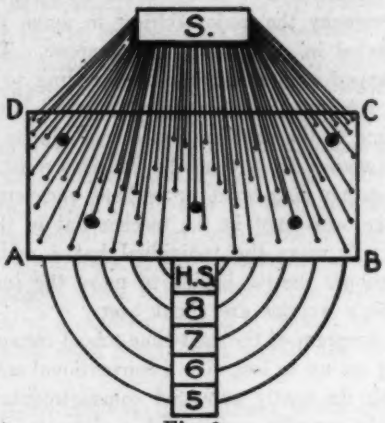


Fig. 2.

▭ABCD=Field of employment.
AB=Conditions that must be met to enter field of employment.
. =Small dots represent "dead end" jobs. (2700 assumed.)
=Large dots represent better jobs. (300 assumed.)
S=Required school attendance.
Rectangles below represent grades from which young people enter trade, industry and commerce.

advanced schooling. The better the job, the greater the opportunity of the school. The better the boy or girl, the more advanced he or she is—the greater the opportunity for the school to be of service. As well a smelter throw out the high grade ore as a school fail to make the most of the greater opportunities which better jobs and better prepared young people present to it.

Schools which can serve admirably the needs met with among the employed young people of a community can be organized. Any community, that in the light of present day conditions fails to organize or indifferently supports such schools, is complacently heartless, scandalously wasteful, and criminally negligent. Indifferent support, in spite of state compulsion, is one of the gravest dangers confronting the development of the part-time school. The full-time schools need more money, and school budgets seem large to local authorities. Many communities today have no more faith in education than the farmers of forty years ago had in fertilizer. They do not quite believe the money comes back. Nevertheless, while no community can afford not to support the part-time work, the employed young people have a special claim to recognition. The employed people under eighteen years of age in any community big enough and live enough to keep its young people at home, earn and carry into the homes of those constituting the economically lowest stratum, enough money to pay all teachers' wages of all the children in all the full-time schools, public, private, and parochial, elementary and high—twice over.

The young people under seventeen years of age in Milwaukee are employed on permits to the number of about 9,000. The report on their earnings made the week ending Feb. 17th, 1920, shows a weekly earning of $85,495.28, or an annual earning of $4,445,754.56 for 8,078 of these young people. We failed to get reports on very nearly 1,000 of them, so our figures are under, not over, the actual amount. This amount of money goes, in the main, to swell the family budgets of those families which most need the increase. To maintain these none too large family budgets at their present level and put these young people on full-time school would require an investment at 5% or about $89,000,000. I have not one word to say against an enlarged full-time school program that will take these young people out of employment provided the situation that would be created by such a program, both educational and economic, is first adequately met. We need not be timid or hesitate to go on with our part-time school problem because of any feeling that a sudden change will sweep away the necessity for our work.

The educational activities in the country are today in the straightened circumstances they find themselves, because educational leadership the past two decades or more has broken down. It has failed to sell education to the public. It has been timid and lacked faith in its cause. Education is the fertilizer of business. Business grows as education becomes effective and shrinks as education declines. To any student of industrial history, the economic value of education is too apparent to be disputed. If there is any fact that such a study of the development of wealth covering long periods will show clearly, it is that business volume rises and falls with the development (education) of the people with a certainty and sensitiveness comparable only to that with which a thermometer responds to increasing or diminishing temperatures.

Does the business man want to talk dollars and cents? Talk it with him. Hoist him on his own petard. Don't try to hoist the business man on the preacher's petard. Hoist the preacher on that.

In time, and a relatively short time, your part-time pupils in the whole upper field shown in Fig. 1 will be among the most active promotors of the whole educational program—both part-time and full-time and it will be increasingly easier to get money to support educational activities.

Don't waste time arguing with people who accuse you of not believing in cultural education. Let them argue it out with the people whose desires are such that they want plumbing instead of poetry in order that they may learn enough to earn enough to live on a plane which will permit the cultural education which they have absorbed in their previous eight years or more of full-time school to survive.

I know very few people who do not believe in cultural education. I know some who believe that there should also be a place where employed people, on such

part-time as the law permits or such leisure as they can command, may go and get what they are convinced they need, as major part of the program. When I say major part of the program I mean thereby to recognize the fact that this "practical"—major program must be intelligently supplemented. I know of no people who would argue that varied and convenient opportunities for democratic choice of training, whereby one gains the power to render a service that has fair exchange value in a world where everybody is expected to earn his own living, is a bad thing, except those who, by some freak of logic, argue that such democratic choice is a Prussianizing of our school system, and that what we need is compulsory Kulture. The people who so argue at this time are merely trying to hitch their wagon on to a prejudice that has grown out of a great world's tragedy.

Indifferent support, I have said, constitutes one of the gravest menaces to part-time education. I have spoken of indifferent financial support. Indifferent professional support, I fear is an even graver danger. "What can you do in a half-day a week?" is a question that has been rather contemptuously asked by schoolmen of those who are in the work many times. I have wondered if this contempt for a half-day a week may not account in part, for the failure in so many cases to accomplish more in ten half-days per week thru eight years. Maybe one mission of the continuation school is to establish the value of the half-day and put "time," the school "currency," on a proper exchange basis.

Part-time school means short time contact with the pupils. Short time contact means matter and method must be carefully considered in order that the short time may count. It must be recognized that the function of the school is to keep the young people growing, and that they grow all of the week.

In our efforts to make the short time contact with the pupils count it must be recognized that there are two kinds of facts which may be taught. There are the facts which are principles and which once having been understood and accepted, the boys and girls are never again the same civically, socially, morally, hygienically, mathematically, or grammatically. They are inoculations and they work after the inoculator is gone. The slogan of our part-time continuation schools must be to teach so that the boy and girl will be different in some respects this afternoon, because he or she has been in school this morning, or different tonight because present this afternoon.

To imbue a whole class with the idea that language —speech—is the priceless possession of human beings, and the thing that most distinguishes man from the monkey, that it is worth refining and polishing, that we wear it as a garment, and are more judged by our speech than any other one factor; to convince them that it is a good thing to care what others think of them, and to wish to appear well to others in dress, conduct, manners, and speech; and then to get them busy working on the improving of their own speech, will perform wonders, get results, and etc.

In the continuation schools, especially with the younger people and where but four hours per week are given, the pupils, in my judgment, should have but one teacher. This teacher should instruct in a major subject, such as shop work or sewing, thru the greater part of the period and carry on the instruction which must accompany the major subject in much the manner suggested in the English work above. The hoop can be tapped each week, and kept rolling to the end that the academic attainment with which the young people come to the continuation school can be clinched and even materially increased. Motives must be supplied, or rather discovered, or perhaps uncovered would be a better term—not in the teacher but in the pupil. Nothing will move the individual but a motive, and when a proper motive begins to move the individual, the teacher's worries are about over.

The program of the part-time school cannot be satisfactorily set up to look like a conventional school program with its neatly arranged compartments side by side, or like capsules end to end, each containing forty minutes of this, fifteen minutes of that, ten minutes of something else, nicely insulated one from the other. It must rather be conceived of in some respects as a rope with its several strands leading thru the period, all present at all times, and each strand ready for a tug when occasion requires or circumstances present favorable opportunity.

Even with the longer hours in effect, as in the case of eight hours a week, something of the above mentioned policy of carrying on associated subjects simultaneously with the major subject, must be continued. In most of our classes spelling cannot be relegated to a regular spelling period, penmanship to a regular penmanship period or a study of vocabulary to a special period, etc., but correct spelling of words used, the best penmanship that the pupil can execute, and reasonably correct pronunciation and use of newly acquired vocabulary can be urged, and the desire to improve in these respects promoted in an effective way by the teacher, whenever in the teaching of this major subject these instrumentalities are used.

In any continuation school where either the 17 or 18 year old people are required to attend, without making an exhaustive analysis the following groups of both men and women will be found:

1. Indentured apprentices. (Written contract with employer).
2. Virtual apprentices. (Verbal agreement with employer).
3. Union apprentices.
4. Independent learners.
5. Helpers.
6. Workers at jobs they do not expect to continue, but having a very definite plan for their future.
7. Unskilled.

For the first four the obligation of the school is very clear, even if difficult of attainment in some cases. The school must supplement the employment of those attending. Highly skilled trade teachers must be provided. It must be recognized that you cannot plant seed corn from nubbins and raise good corn, nor plant oats and raise barley. Teachers must be made out of skilled tradesmen. Occasionally they can be found ready made or especially promising. No administrative difficulty should be placed in the way of obtaining such promising material, and they should be judged solely and only upon their ability to make good in reasonable time. The application of the usual certification methods, or the surrounding of the one charged with the selection of these teachers with the usual restrictions will fall like a blight and a curse upon the successful development of the vocational work in these schools. It is too big a price to pay to convention, and if the full-time school fabric will not stand the wrench, then such degree of separation should be sought as will save the part-time work from being hamstrung by its association.

In its ultimate development in our cities, the part-time vocational school classes must become as varied in subject matter taught and supplementary equipment, as the commerce, trades, and industries of the communities in which the schools are conducted. No matter what the trade school or full-time school development may become, there will always be a hundred people in part-time supplementary schools, learning as they work, to one in full-time trade or other industrial school. These schools will always be more or less unconventional in that their equipment and subject matter will be changeable and unique. Quick adaptations will have to be made and unusual conditions promptly met, or enthusiasm will be lost, and sustained interest impossible.

A large portion of the girls will be found desiring and needing straight home making courses involving sewing, cooking, art as applied to attire and the home, knowledge of values, importance of thrift in its best sense, health civics, guidance in their reading, and a strong effort to bring about that friendly attitude which will lead young people to look to the school for counsel and advice. This latter spirit must pervade the work of both boys and girls.

The problem of a more varied opportunity for women in industry must be analyzed and met fairly. Many efforts that will likely fail will be made to provide the varied opportunities and such failures must serve to furnish us with the necessary experience and knowledge to work out the things that will not fail. All opportunities for more varied and particularized vocational training for women must live alongside of and in voluntary competition with accessible and freely offered home making courses. Women must not, by lack of opportunity or of choice, be forced into varied vocational courses, which courses may thereby be promoted on an artificial basis and represent a fictitious success. The reverse of this conclusion is also in part true. The fact that it seems the majority of young women want the home making courses must not be assumed to the extent of forcing the women who want the other work into home making classes and then counting their presence there as evidence that it is the thing they want and should have. It is plain however, I think, that we must start with the home making courses and refine and adjust our work from there, particularly in our compulsory classes.

The unskilled boy workers must have their academic attainment conserved and must be worked thru observation or reservoir classes as distributors into more and more definite channels leading toward more and more seriously and thoughtfully determined programs which it shall be the school's function to help them to realize. The school must develop as conditions point the way. School authorities must follow courageously where the facts lead. The development will be different in different communities as commerce and industry of the community differ, and must be made as broad as the interests of the young people determine. The great danger is that those entrusted with the part-time work will see it too small. There will be a disposition to couple this work up with the manual training of the full-time schools, thus making a job for the director that will seem initially to justify his salary and which will relieve him of the necessity of developing the new field to warrant his continuance. Necessity is sometimes the mother of vision. Vision locating the directions effort should take must be followed up by such practical considerations as housing equipment, courses of study, employment of instructors, etc. No blue print of this development can be made. Instruction must be largely individual and must take the young people where it finds them. There must be no disposition to quarrel with them about their present condition, but they must be taken as they are and go on from there. The condition of the individual must be met here as it is met in the doctor's office.

Courses of study must be largely determined and held to form by near and clear objectives which will simplify the selection of matter to be taught, and suggest the method of instruction. The listing of many things which represents the usual course of study with time factors nicely fixed, determining the form instruction shall take, and the attempting of too definitely prescribe methods of instruction, is much like attempting to control the shape a maple tree shall assume by the application of outside force. The tree developing in compliance with an inner controlling living principle will do a better job. I fully realize the inadequacy of such a comparison, but something analogous to that inner controlling principle working thru the teacher while he works toward a clear objective, permitting him to be quite free in the use of all available instructional matter will keep both the teacher and the pupils alive

and result in a better "course of study" than non-teaching experts would likely impose. The teacher training must be of a character such as will result in a properly actuated teacher controlled by a knowledge of principles vital to all good instruction. These schools must develop. The teacher must know that they must develop and feel a responsibility for their and his own development.

Criticism of effort that kills initiative must be avoided. The supervisor must watch the direction of development and use the pruning knife at times, but more often he needs to turn up a little bark to see if the tree is green and growing, look for buds and signs of life and promise. A man with a micrometer has no place in a garden.

In this new field we must not be discouraged if we cannot make these schools at once all they ought to become. I have seen many weak efforts in our own school and the schools thruout the country, but have not seen any that were not worth while as a starter.

The director of these schools will have to be clothed with unusual authority, that is for the educational world, and he will need a friendly board with vision and faith in him and in the work, or these schools will become a Cinderella in the household, or a mere form-a-truck attachment to the full time schools. Forced on to a timid superintendent and a reluctant full-time board, they will die and never get buried because the indifference and timidity that killed them will never develop the courage to bury them.

We need to see the great opportunity in the whole upper field represented in Fig. 1 and appreciate the great work that with proper support and administration could there be accomplished. I do not know the exact figures, but it is safe to venture the assertion that every fifteen years or less on the average, every position of skill, every position of responsibility, every position requiring preparation in our whole economic and social structure must be filled by some one especially prepared by training for the place, and that statement takes no note of the expansion and growth of trade, commerce and industry.

The time should come when the business man, if intelligent, will see the thing he calls the "market" in the aggregate, and when he sees a man, one out of the aggregate, only half the average man he could be made by proper educational opportunity, he will see that in the geographical area represented by that man, half his market lost. This seems far fetched but it is absolutely accurate and mathematical. Even on the low plane of economic self interest business in the aggregate must support all our schools if business is to grow.

I think it is a fair conclusion to say that in the interest of everybody, those who leave school early must be given further opportunity. Those who have their plans interfered with by unexpected responsibilities must be given a chance. Those who develop late must be given a chance. Those who start wrong and find it out in time must be given a chance. Those who have a chance and need assistance must be given help. Those who have had one chance and need another must be given it. The value even of those things we call our possessions depend upon such an enlightened policy.

The wealth of our nation lies in its manhood and womanhood not in some indirect, remote, and fanciful way, but positively, directly, and, in a way, susceptible of mathematical demonstrations. That nation prospers most that best conserves and develops its human element. There is in the upper field of Fig. 1 a whole homogeneous group of problems that need to be organized together. The reaction upon the full-time school would be positive and beneficial. The group in this upper field that would come under the influence of the schools would develop into a force demanding support for education that could not be withstood. Full-time schools will be both better, and better supported, when part-time schools are more adequately and universally organized.

Basketry Work done in the High School at Sycamore, Ill.
Miss Cora B. Miner, Supervisor.

Industry as an Elementary School Subject

A. Adele Rudolph, Supervisor of Industrial Arts, Philadelphia, Pa.

SOMEHOW handwork reminds me of a lost child who has been fostered by various homes, and by the process of evolution has climbed higher and higher, with an ever-widening vision, until today we find it in its sixth home on the mountain side. The first home, down at the base of the mountain, was the Disciplinary; going on up, we find the second, or Utilitarian; the third, or Typical-Industrial; the fourth, or Aesthetic; the fifth, or Social, and now the sixth, or Real-Industrial. This last home and its vision contribute the broadest interpretation of the subject it has yet received. It remains to be seen whether this last home is on the peak of the mountain; whether this last step has brought us to the goal of our ambition, or whether, perhaps, it is only the best interpretation of the work for the present time and conditions. At present it seems to us as tho handwork had found its true mo'her in the study of industry, and that the day is dawning when handwork will be assimilated into the regular school curriculum as the means of concrete expression.

If, ten years ago, it had been said that in 1919 the children of the elementary schools would be studying a subject called, "civics", teachers would have raised their hands and said: "Another subject added to the overcrowded elementary school curriculum!" Is civics a new subject or only a more effective organization and broader interpretation of the material culled from the courses of study in the elementary school? I am sure that civics is only "an old friend in new garb." The same way with handwork—most of the subject matter for a course of study in industry can be found in the present elementary school courses in arithmetic, hygiene, nature study, language, geography, history and even in civics. And right here let me say—the elementary school already focuses the attention of the children upon man as a writer, an artist, an explorer, a fighter, a ruler, a citizen; and it is time it should study him as a worker. The kindergarten has long since laid the foundation along this line. All that is necessary is that the elementary school should build upon this foundation.

When I think of handwork, I think of it as a tool of expression. Words express ideas; handwork expresses ideas. Both are tools; both are necessary tools of expression. The language course has been remarkably well worked out for the elementary schools; the question that will be before us for many years is, "How can we organize handwork in the elementary school so that it will have an equal value with language as a tool of child expression?" The chart (Fig. 1) explains one scheme for such an organization. According to the chart, handwork has been divided into two large groups —first, "expressional" or non-technical handwork; and second, "technical" handwork. The chart shows also, first, the relative importance which should be assigned to "expressional" handwork in the lower grades as compared to "technical" handwork in the upper grades; and second, the two sub-divisions of expressional handwork, —first, illustrative handwork which gradually loses its importance in the curriculum as children learn to visualize and to think in the abstract, and second, representative handwork, which is the forerunner of technical handwork.

Under illustrative handwork are listed those handwork projects which can be used as a means of impression, i. e., as a method of teaching other subjects. Only such handwork as is the result of free, spontaneous expression on the part of the children is included in the term illustrative handwork. For instance, in a first grade class where the children had just finished dramatizing the story of Little Bo-Peep, the teacher gave the children some scrap paper and told them to tell the story of Little Bo-Peep with their pencils (Fig. 2). It should be just as natural to say "Draw it" as to say "Tell it."

"Illustrative" handwork, as it is called, is all right if it is the result of free expression on the part of the child. Sometimes the "organizator" kills all handwork values. Not so long ago, I wanted to photograph a table representation of a village of primitive peoples made by children in a third grade class, but on making inquiries into the methods of teaching this particular project, I found that it was not handwork of the free expressional type, but of the "exercise" type. There had been a series of lessons in dictated paper construction work. The result was thirty to fifty huts, thirty to fifty boats, as many more trees and so on, until each child had made at least one of each of the component parts of that village. It was not even a cooperative handwork project, because no individual or group of individuals were made to feel responsible for any particular part of the project. Was that village the outcome of the child's interest in the subject? Whose village was it,—the child's, the teacher's, or the person's who planned the course of study? What had the children gotten out of the four to six hours of work? Perhaps a little more skill in handling paper, ruler, pencil, scissors, paste and crayon. I doubt if the majority of children in grades one to four feel the need for skill, especially in paper construction, where so often the scissors come in so handily in rectifying a mistake in measuring or folding.

Let us make a contrast with another group of children who constructed an Eskimo village when the teacher used handwork to illustrate a story. In a second grade class the children had been reading a story about two little Eskimo boys, and because of their in-

terest in the story and in the illustrations in the book, they had asked and obtained permission from the teacher to picture the story on the table. Realizing that if the project was to be effective, it must be finished before the youngsters lost interest, the teacher had assisted wherever she felt the problem was beyond their capabilities. She had made the form for the igloo, and the wigs for the dolls; otherwise it was the children's own work. The children had placed mirrors to represent water; covered the table with cotton batting for snow; stained and dressed the dolls; made make-believe utensils and implements; and staged the dolls with the necessary "props" to illustrate the pursuits of the pupils. The teacher suggested that several of the children tell me the story represented. I selected three, who told me the story in serial form. Pointing to the various groups on the table, the children told me about the manners and customs of the Eskimos and were able to answer practically all my "why" questions which I had asked in order to test the depth of their knowledge. What had these children learned? First, they had handled a variety of materials; second, they had had some experience in cooperative work (the class had been divided into groups, each group being responsible for a scene); third, when doubts arose in any group concerning the scene they were depicting they had read and reread, if necessary, those portions of the story which dealt with their project and thus in giving concrete expression to their ideas they had clarified any hazy notions which they may have had and the project took the place of a review.

In this same school, I found the children in grade one working on a "representative" project. They were furnishing a house which the teacher had constructed from wooden boxes. The house was intended as a home for the "Three Bears." The children had woven rugs; sewed and printed curtains and bedding; decorated and papered the walls; made and decorated clay bowls; and constructed and stained wooden furniture. This work had given the children opportunities for measuring, and for decorating different materials, in the use of judgment in the selection of color schemes, and in the manipulation of various tools and materials.

The great business of little children is to become acquainted with the world about them. This includes a general knowledge of materials—how they behave, what purpose they will serve, and how they may be controlled. It seems reasonable therefore that handwork for the lower grades should deal with a variety of materials with which children may experiment quite freely in order to gain first-hand experience in what can be done with them.

Turning again to the chart (Fig. 1) one notes that grades five and six are marked as the transition period between the representative projects of the lower grades and the well defined technical subjects of the upper grades. For want of a better term I have called this fifth and sixth grade portion "industrial arts." The list of problems which might be studied in these grades is given on the chart (Fig. 1).

From now on I shall confine my remarks to my own field of supervision with boys in grades five and six in Philadelphia. This city being primarily an industrial center, five typical lines of industrial work have been selected around which to group the handwork activities and their related subject matter, viz., textiles, wood, paper, metal, and clay and their allied industries. The first three—textiles, wood, paper and their allied

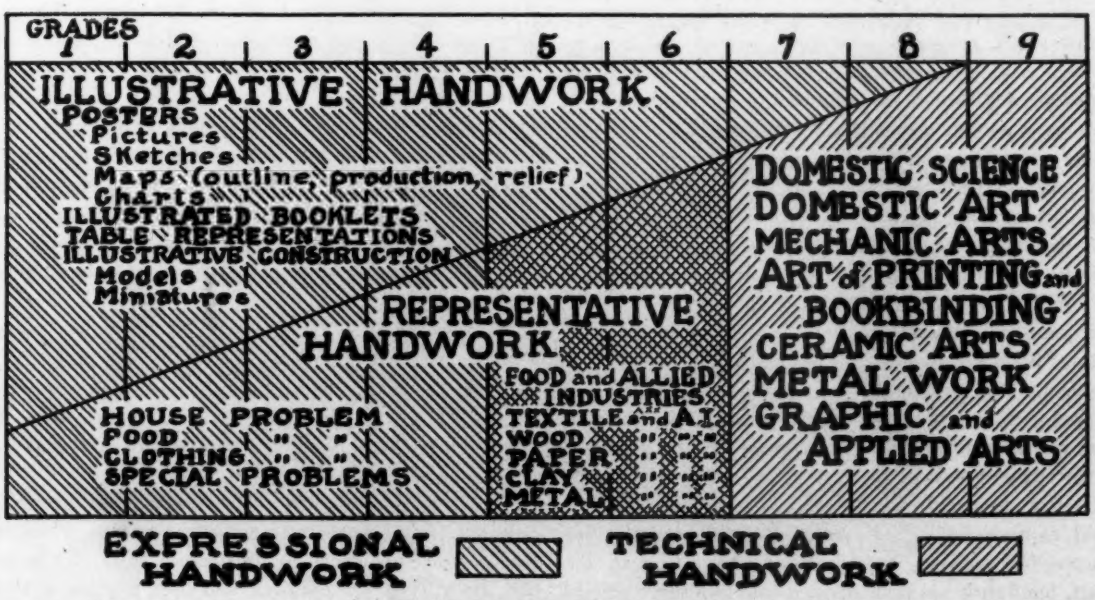


FIG. 1. RELATIVE IMPORTANCE OF ILLUSTRATIVE HANDWORK AND THE DEVELOPMENT OF TECHNICAL HANDWORK IN THE ELEMENTARY SCHOOL CURRICULUM.

Fig.2

FIG. 2. A CHILD'S PENCIL STORY OF LITTLE BO-PEEP.

industries have been introduced into our schools. Metal, clay and their allied industries will be introduced as soon as conditions warrant. Each topic being taught is considered from three angles,—first, the transformation of raw into manufactured materials; second, the processes involved in transforming manufactured materials so that they will be of most value to man; and third, and most important phase, the study of the workers who bring about this transformation. The training aims to give the pupil a sense of contact with workers of many types. Through the handwork experience, the class discussions, the teacher's demonstrations, and the visits to neighborhood workers and to the museums and industrial plants, the boy gains some of the worker's knowledge of the peculiarities and the manipulation of various materials; and may enter into the experiences of such workers as the carpenter, bookbinder, weaver, dyer, chemist, designer and many others, thus preparing himself for a better understanding of his fellow-man.

We do not, nor do we ever expect to, carry on all industrial processes as they are actually carried on today in the mill and factory, but what we do hope to do is to give the boy those experiences and that fund of information which will take him from the "known to the unknown" so well equipped mentally that he will be able to interpret the complicated machinery and processes and the specialized work of the workers in terms of his schoolroom experiences.

About two months ago, I took a class of Sixth B boys thru a textile mill in order to discover whether sixth grade children could interpret intelligently a modern industry, after experiencing the simplified industrial processes of the schoolroom. (Fig. 4 to 9). The man who guided us understood that he was to give no information unless the boys questioned him. Never once did the youngsters ask such questions as, "What's he doing? What's that machine for?" but rather questions like these—"That's a Jacquard loom, isn't it? May we see how the cards work? Where does the dyer rinse the yarns? Are those women looking for mistakes in the cloth?" And many more such questions. The boys were so alert to what was going on and so interested that not one of them showed any inclination to get into mischief. You must remember that these youngsters had woven on small looms (Fig. 4) and also on a treadle loom (Fig. 5). Both of these looms have the same principles as the looms used by the weavers in the mills. (Fig. 6) By some very simple tests, the teacher had shown the boys how the chemist discovers and proves the different fibers in fabrics. (Fig. 7). The boys had also entered into some of the experiences of the designer and the dyer by studying textile designs —woven, resist, and direct coloring. (Fig. 8 and 9) Of course, all of this work was very elementary but fundamental and it gave the boys the necessary background for appreciation of the visit to the workers in the textile mill.

By such methods of presenting industrial information we aim to give the boys industrial knowledge in a simple, direct and interesting manner, with the hope that men of broad vision will become the natural product of our schools. One recalls the scene in "Mere Woman" played by Charlotte Walker several years ago in which the puddlers are berating one of their fellow workmen because he spends all his leisure moments in his room working over an invention that will revolutionize the steel industry. He was a foreigner who had had a very broad training,—a university man, I believe. One of his mates asked, "Why should a puddler care? I don't care what happens to steel," and the man retorted, "You do not care because you are a puddler and always will be a puddler."

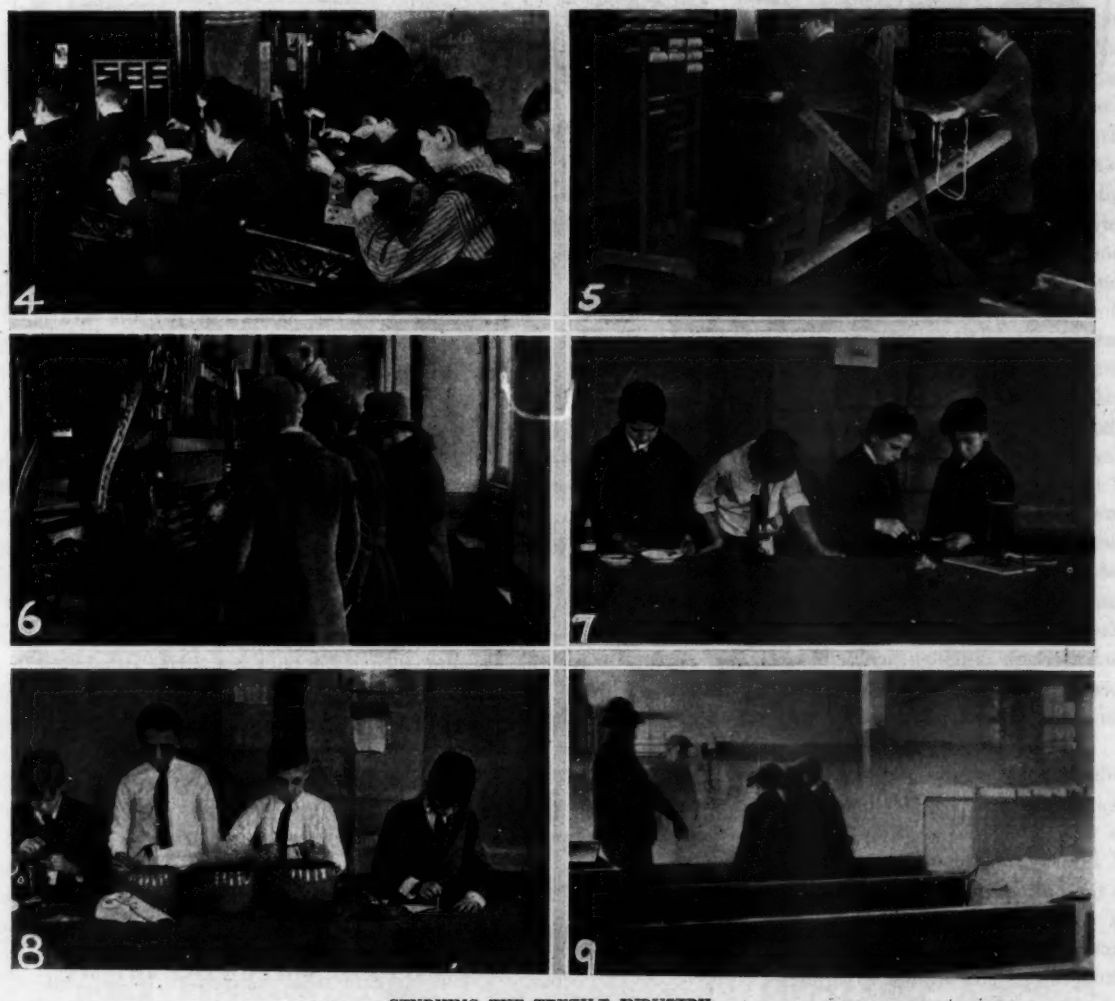
Some employers prefer that their men shall remain puddlers. The policy of one well-known chemical firm is to take high school students and train them for a simple mechanical task in the methods preferred by that firm. They say that such employees make much better workmen than college trained men and women. If you inquire among the workers in these particular laboratories, you will find only the very young employees are satisfied. Those that have been there four or five years find that they are in blind-alley jobs. The methods taught by the firm make the young men and women practically useless in any other firm unless they

are willing to go back four or five years and start over again with the new firm. These young men and women with initiative do get their college training finally, but at a terrible price. The schools, therefore, are not training John to be most useful to Mr. Brown, but they are educating John to be most useful to John.

The child gets contact with the workers not only thru visits to the workers but also thru the manipulation of the workers' materials. The illustration (Fig. 10) shows fifth and sixth grade work in stencilling and peg printing and indicates the wealth of design which can be secured from even these grades. An interesting fact in regard to the peg printing is the variety of colors which the children have used and yet they had only the three color-pads,—red, yellow and blue. The teacher felt that the youngsters had learned more from their peg printing work concerning the possibilities of red, yellow and blue than they had ever learned from the use of crayons and water colors.

Thruout all our work color and design play an important part, but not the part they played when handwork was in its fourth or "aesthetic home." In that home the art teachers and directors were fostering handwork, and naturally they would think of it in terms of color and design, so handwork became the handmaiden of art, which is an unnatural relationship. But now that handwork is being directed by educators primarily interested in elementary school education as a whole rather than in any one particular field of education, handwork is passing from the fourth or "aesthetic", thru the fifth or "social", into the sixth or "real-industrial", where art and handwork take their proper relationships in the study of industry.

The work in paper follows the same general lines as that carried on in the study of textiles. The children make, bind and decorate books; the teacher demonstrates the making of paper, and the etching and printing of a plate. By means of lantern lectures, discussions and visits, the teacher brings the boys into as



STUDYING THE TEXTILE INDUSTRY.

Fig. 4. Studying the Processes of Weaving. Fig. 5. Weaving Rugs for Home. Fig. 6. With the Weaver in the Mill. Fig. 7. Proving Wool is Wool and Cotton is Cotton. Fig. 8. The Decoration of Textiles. Fig. 9. In the Dye House.

Fig. 10.

(Left) Getting Rags Ready to Make Pulp for Paper. Note the Meat Grinder. (Center) Books and Rebound Books That Boys Can Use. (Right) A Visit to a Bindery. "She Sews Books Just as We Do!"

close contact with the workers and their work as is possible. (Fig. 10).

The work in wood has been divided into five steps —first, the projects requiring no definite measurements, but to be made as large as the stock will allow. The stock which is given to the boy is in good proportion, and if he follows directions accurately and does the planing and the sawing carefully, the finished article will also be in good proportion. From the point of usefulness, what difference does it make whether a plant label or a sandpaper block or the base for a toy is four inches long or misses that measurement by an eighth of an inch? You cannot make a boy feel that it does make a difference, and from our standpoint it is not necessary to try.

But with the exception of this first division, the woodwork should conform to definite size, the projects determining the degree of accuracy required,—not the will of the teacher or the course of study being the arbitrator. The second group of projects require definite measurements, using the one piece of wood, and requiring the use of the plane across the ends. The third group is based on slat construction; the fourth on box construction, and the fifth covers blind nailing.

Under each group are found utilitarian projects and toys; the groups are also divided into required and elective projects, i. e., during the time alloted to each group the boys make one required project, and those boys who finish this required project before the time is up, may select projects from the list of electives in the same or previous series. The lists of projects—and to these the teacher may add as she deems it wise—are selected from child's environment with the hope that if he is trained to meet problems in his present environment he will be prepared to meet adult problems when he becomes an adult. While studying the manipulation of wood, the children are brought into as close touch with the workers in wood as is possible. (Fig. 11).

Someone recently raised the question whether we were teaching processes as the outlines in our course of study seemed to indicate that we were. No,—not processes, but boys. In a course of study for a large city one must indicate the place and the distance travelled. The socalled "processes" are simply guide posts along the way.

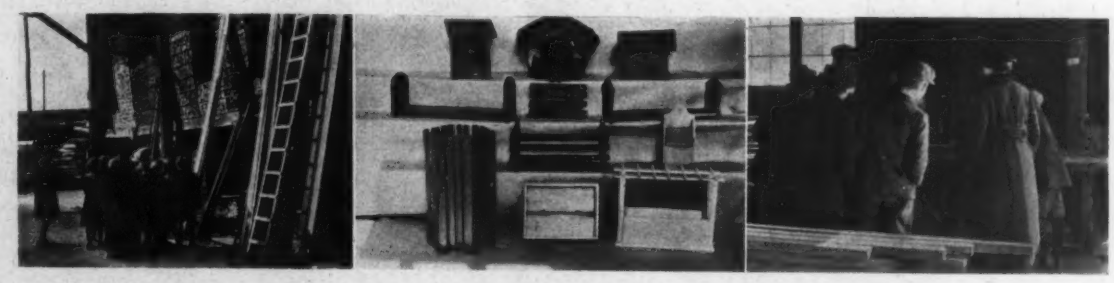


Fig. 11.

(Left) In the Lumber Yard. (Center) Problems in the Making of Which the Home Is Usually the Deciding Factor. (Right) With the Man in the Saw Mill.

A "MODERN ART" BOUQUET

Ella L. Langenberg, New York City

THE magic touch of Art! What does it not do to the most commonplace materials? Paper and paint in the hands of the ignorant or the poorly trained are menaces to good taste and refinement. But paper and paint, used by the skilled fingers of the craftsman or the "one who knows" become messengers of joy, transforming the commonplace, and affording a thrill of delight to all who have eyes that really see!

Compare the realistic flower forms, fashioned with ingenuity and crepe paper, and sprayed with perfume, in the effort to carry realism still further, with the flat, simple and decorative arrangements that modern art offers as a note in a general scheme of design. The first will undoubtedly be preferred by the untrained mind that reaches out for beauty. The second will immediately interest those who have juggled understandingly with the fascinating mediums of paper and paint, and have produced beauty that is founded on the rocks of law and order.

Every art supervisor that is worthy of her calling desires most earnestly to take part in any school activity, be it annual exhibit, the graduation exercises, a festival or pageant, a convention or other gathering, an event of local or civic interest, or whatever may be the occasion of assembling together a number of people. The house must be set in order. The setting of the stage is quite as important as the actor. The art department should function freely here.

Instead of turning for help to the ever ready crepe paper flowers and crepe paper streamers, why not, this year, plan a project of educational value, making it at the same time an exercise of real pleasure?

Fig. 1. A Decorative Bouquet.

Fig. 1-A. Another Bouquet.

It has often been said that art should make the world a better and a happier place in which to live. The teacher of art certainly has a great opportunity, for she has at her disposal that open sesame of joy—the use of color!

Large bowls of decorative paper flowers in brilliant colors, set about the room, will give a festive note to any event. Bear in mind that whatever is put into the room in the way of color will have a psychological effect upon the audience. Large, plain areas of blues, greens, and violets produce quieting, serene effects, whereas lighter, gayer, and more sparking effects are produced by the use of many small spots of bright colors.

The decorative bouquet (Figs. 1 and 1A) made entirely of cut paper, can be handled with success in a classroom, by making the lesson a community affair, each pupil contributing one flower as his problem in design and color.

First of all, decide upon the color scheme for the entire bouquet. (See the Color Chart, Fig. 2). This might be one intense color, used with black and white. For example, bright yellow flowers with black and white designs. Or, it might be a monochromatic scheme; that is, tints and shades of one color, used with black and white.

For a contrasting scheme, complementary colors would be the choice. For example, blue flowers decorated with black and white; and orange flowers decorated with black and white. (See "Color Harmonies", under Fig. 2).

If the desired effect is one of many colors, the iridescent quality of analogous colors will produce a vibrat-

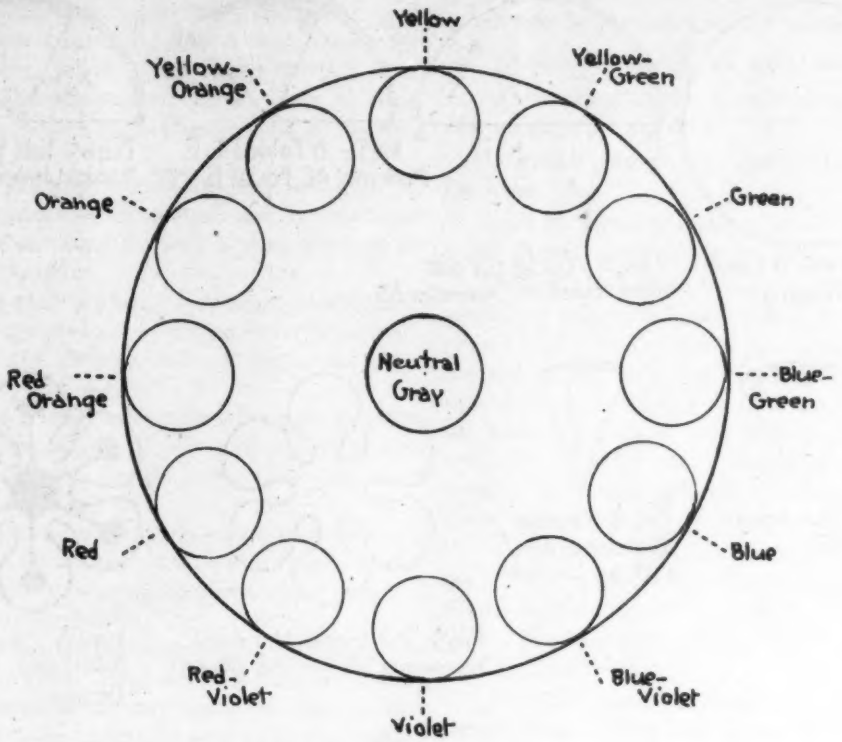


Fig. 2
COLOR HARMONIES

Monochromatic Harmonies
(Self Tones)

ⓐ Tint of Yellow (light yellow), Normal Yellow (full color), Shade of Yellow (dark Yellow).

ⓑ Tint of Green (light green), Normal Green (full color), Shade of Green (dark Green)

ⓒ Tint of Violet (light violet), Normal Violet (full color), Shade of Violet (dark Violet).

All colors of the chart can be treated in the same manner. Grayed colors may be used in monochromatic harmonies.

Complementary Harmonies
(contrasting Colors)

ⓐ Yellow and Violet.
ⓑ Yellow-Green and Red-Violet.
ⓒ Green and Red.
ⓓ Blue-Green and Red-Orange.
ⓔ Blue and Orange
ⓕ Blue-Violet and Yellow-Orange.

Tints, Normal, Shades, and Grayed Colors may be used in complementary harmonies.

Analogous Harmonies
(Related or Neighboring Colors)

ⓐ Orange, Yellow-Orange, and Yellow.
ⓑ Yellow, Yellow-Green, and Green.
ⓒ Yellow-Green, Green, and Blue-Green.
ⓓ Green, Blue-Green, and Blue.
ⓔ Blue-Green, Blue, and Blue-Violet.
ⓕ Blue, Blue-Violet, and Violet.
ⓖ Blue-Violet, Violet, and Red-Violet.

Analogous colors are any three or four neighboring colors. Tints, normal, shades, and grayed colors may be used in analogous harmonies.

FIG. 2. COLOR CHART TO BE USED IN MAKING BOUQUETS.

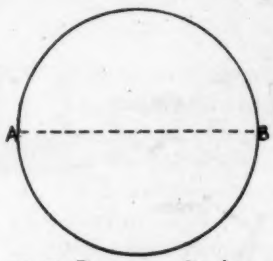


Fig3-Draw a Circle 2½" Radius

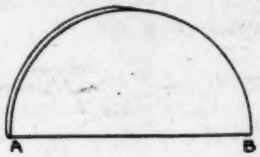


Fig4 - Circle cut out and Folded on Diameter AB

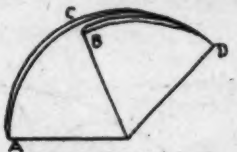


Fig5 - B Folded to C Making AC Equal to BD

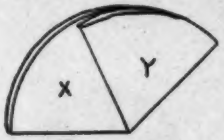


Fig6 - Fold Section X Back Under Y

Fig7 - Fold again on Radius

Fig 8-Design Sketched and cut on Six Fold

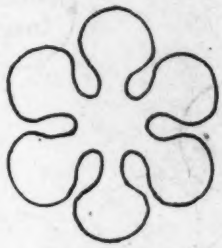


Fig9 The Circle Unfolded Showing Six-parted Design

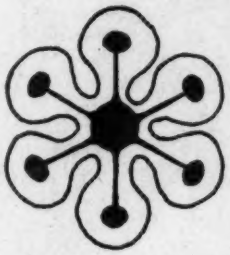


Fig9 A Showing Additions to the Design

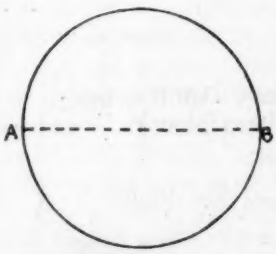


Fig10-Draw a Circle 2½" Radius

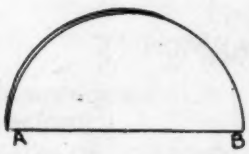


Fig11 - Circle cut out and Folded on Diameter AB

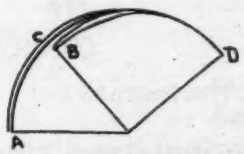


Fig12 - B Folded to C Making AC Half of BD

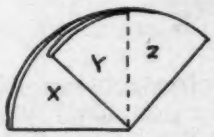


Fig13-Fold Section X Back Under Y and Z Forward Over Y

Fig14-Design Sketched and Cut on Five Fold

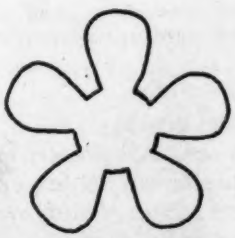


Fig15-The Circle Unfolded. Showing a Five-parted Design

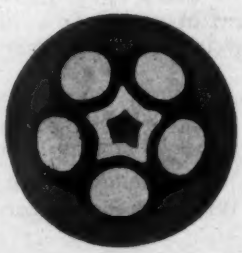


Fig.15 A - More Suggestions

ing and brilliant effect. For example, yellow-green, yellow, yellow-orange, and orange. These colors when used together produce a harmony, because they contain the common element, yellow. For variety in this color scheme tints and shades, and grayed tones of these colors may be added. (See Analogous Color Harmonies, under Fig. 2).

Whatever the color scheme, use black and white in the design, because they are neutrals and the repetition of them serves as a bond of unity, a tying together, as it were, of all the colors.

Black and white are also the strongest possible contrasts, so their use produces a carrying power, which will reach the eye at a distance, and will add to the effectiveness of the entire design.

Having decided upon the color scheme for the bouquet as a whole, each pupil will plan his individual flower. Use one color for the background and black and white in the design.

The inspiration for the design may come from flowers or pictures of flowers. There is no necessity for making a realistic drawing of the flower. Look immediately for design suggestions.

Note the shape of the petals and the radiating design which they make. Compare the petals of different flowers as to shape, size, and arrangement. Observe the shape and size of the center, the arrangement of pistils, stamens, etc.

Ideas for decorative flowers may be obtained from textiles, both ancient and modern, but if used, care should be taken that children do not lavishly copy what someone else has done. Their work should be spontaneous and creative.

Materials required for each flower.

2 four or five inch circles of colored paper.

1 two-inch circle of oak tag or manila.

A number of circles of thin white paper for pattern cutting.

A piece of heavy spool wire the length desired for the stem.

½ inch strips of colored paper (the same color as the flower), for winding the stem.

Design shapes which may represent the flower petals, the silhouette of the flower, or any part of it, are cut from circles of thin paper. The method of folding and cutting for a five parted and a six parted design, is shown in Figs. 3 to 15. When a good pattern has been cut, recut it from black paper and paste it upon the colored circle. Add elements of white to complete the design and also to enhance it by the note of contrast.

To make the stem, slip one end of the wire thru the 2 inch circle, fastening it by means of a knot, or by sliping it back thru another hole, and twisting it upon itself. Wind the wire with ½ inch strips of paper the color of the flower.

Paste the two inch circle to the back of the designed circle. Cut a hole in the center of the second colored circle and slip the stem thru it. Pasting this circle to the back of the flower makes a neat finish.

The illustrations (Figs. 1 and 1-A) show two attractive groupings of these decorative designs. The jar itself is an important color note in the whole arrangement.

Courses of Study for Rehabilitation Classes

Chas. R. Miller, Williamson Free School of Mechanical Trades, Williamson, Pa.

THE problem of outlining courses of study in industrial subjects for rehabilitation classes is one which has been causing considerable concern to many schools, if we are to judge by the reports from the Federal Boards of the Philadelphia district. It is at their request that the courses in operation at this school are being prepared for publication, and it is hoped that they may be of value to schools giving similar courses.

After one year's experience we are convinced that the material given in each course fills the needs of these men.

With few exceptions the men have been given one year in which to complete their training, consequently the courses have been outlined to cover that period.

Supplementary material can be added in case the training period is longer than one year. Or it may be that the number of hours work per week is less in other schools than here, in which case the material will cover a longer period.

Williamson school operates on an eight hour a day basis which enables the student to cover an immense amount of work in one year's time.

As in all well correlated courses the work should begin with very simple problems dealing with the fundamental principles before proceeding to the more complex problems. Each piece of work in the shop or each problem in drawing should be the foundation for each succeeding step in the course.

The instruction should be purely individual, as indeed it must be, since two men are seldom admitted in one course of study at the same time. The previous training of the man makes it impossible also to teach under the group method of instruction. One may have a knowledge of the subject before entering and can advance more rapidly than the one to whom the work is entirely new. The physical condition of the man also governs the progress made in the work.

In order to keep an accurate record of the progress of each man from month to month, a progress chart is

used. This is also helpful in making out the report which must be forwarded to the Federal Board each month, giving the class standing of each man. From the illustration it will be seen that Blatt entered the school in September. At the end of December he was behind one week with his work in drawing. In January he only completed three weeks' work, but in February five weeks' work was completed, which brings him within one week of the total number of weeks. The marks are placed opposite the subject by the instructor in whose department the work is taken. This card was

REHABILITATION CLASS
PROGRESS CHART
NAME. Blatt. SUBJECT. Arch. drawing.

	JAN	FEB	MAR	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT	NOV	DEC.
DRAWING	18	23							4	7	11	15
CARPENTRY	16	21							4	8	10	12
MASONRY	18	20							3	7	11	14
ESTIMATING	17	21							3	8	10	13
STR. of MAT.	19	22							5	9	11	14

Jno. T. Van Stan. INSTRUCTOR.

Form Used for Recording Students' Progress.

chosen at random from the files and represents the average student.

In addition to this report the regular classroom report covering attendance, conduct, industry, and quality is kept.

Each school has its own problems to meet in training these men as the conditions are different at all schools. However, there are many things in common at all schools, or at least there should be. The shop equipment should be such as to give complete training in all subjects of the trade. The teaching staff should consist of men who are not only skilled in their trade and in teaching that trade but men who have a live human interest in developing these wounded men to a high degree of efficiency, so that when the training period is finished they will go forth filled with the determination to take their place in the commercial field with the best of their kind.

The housing conditions, medical attendance, and school regulations are all points which should come in for important consideration.

The following courses of study are in operation at the Williamson school and each will be outlined in detail in subsequent issues:

1. Machine Drawing and Design.
2. Mechanical Drawing.
3. Architectural Drawing.
4. Building Construction.
5. Agriculture.
6. Machine Shop Practice.
7. Cabinet Making.
8. Switchboard Operating.

All of the material given here is the work of Mr. James A. Pratt, Director of the Williamson school, whose efforts have been ceaseless in preparing and carrying forward to successful operation the work for wounded soldiers at this school.

MACHINE DRAWING AND DESIGN.

Summary of Course.

The *first three months* of this course cover simple lettering, the elements of projection, and principles of mechanical drawing as applied to machine construction. Machine shop work, pattern shop work, and foundry practice are introduced as related subjects. Practical English, vocational mathematics, and strength of materials are also introduced as related classroom subjects.

During the *second three months,* spur, bevel, worm and helical gears are studied. Formation of involute and cycloidal tooth are analyzed. As related material in machine shop work, standard tool equipment, feeds, speeds, grinding wheels, grindstones, and the trade grading of steel are studied. Pattern shop practice is discontinued and foundry practice also except for prescribed visits to a commercial foundry for the purpose of studying productive processes. Practical English, vocational mathematics, and strength of materials are continued as related subjects.

During the *third three months* the elements of mechanism are taken up, including pulleys, belting, linkage, cams, and welded joints. Pipe-fitting standards and equipment are studied. Machine-shop practice is discontinued. English, mathematics, and strength of materials are continued as related subjects.

During the *fourth three months* the time is devoted to elementary jig and fixture design. English, mathematics, and strength of materials are continued as related subjects.

The following textbooks are used in connection with this course:

Mechanical Drawing, by Anthony.
Machine Drawing, by Anthony.
Practical Treatise on Gearing, by Brown and Sharpe.
Vocational Mathematics, by Dooley.
Wood Patternmaking, by Turner and Towne.
Foundry Practice, by Tate and Stone.
Machinery's Hand Book.
English for Business, by Webster.
Tools, Chucks, and Fixtures, by Dowd.
Elements of Mechanism, by Schwamb and Merrill.
Materials and Construction, by Pratt.

Detailed Outline of Machine Drawing and Design Course.

First three months, 20 hours per week. The grades and catalog specifications of drawing papers, tracing papers, tracing cloth, blue print papers, and photographic papers.

Study of the drawing instruments; details of construction, methods of adjustment, proper care, and construction of the drawing board.

Sheet No. 1—Suggested size of sheet 20"x27½".

Use of instruments on straight, curved, dotted and full lines, including use of irregular curve. The standard cross sections studied and drawn.

Sheet No. 2—Lettering.

Development of a slant capital and lower case alphabet.

Sheet No. 3—Geometrical problems.

1. Bisect a straight line.
2. Bisect an arc of a circle.
3. Bisect an angle.
4. Lay off an angle equal to a given angle.
5. Lay off an angle and bisect it, using the protractor.
6. Lay out a triangle having sides of specified length.
7. Draw a tangent to a circle and locate point of tangency.
8. Draw a square in a circle.
9. Inscribe a hexagon in a circle.
10. Inscribe an octagon in a circle.
11. Inscribe a pentagon in a circle.
12. Draw an eclipse (trammel method).

Sheet No. 4—Tracing.

The tracing of a standard drawing.

Suggested—Details and assembled views of turret lathe, grinder, planer.

Sheet No. 5—Elements of projection (third angle only).

Use as models simple machine parts. (1) Front, top and side views of simple shape, without dotted lines; (2) Same introducing dotted lines; (3) Same introducing a section; (4) Bolt with hexagonal head and nut; use conventional method of thread representation; dimension this bolt and nut for all necessary measurements, being particular that length of thread is given; (5) Front, top and side view of a model introducing a view severing about a vertical axis; (6) Three views of a selected machine part giving all dimensions.

Sheet No. 6—Studies in the various screw threads.

(1) V thread; (2) U. S. Standard thread; (3) S. A. E. thread; (4) Square thread; (5) Buttress or half V thread; (6) Double thread.

Details of the construction of each thread carefully taught.

Sheet No. 7—Elementary studies in gearing.

(1) Names of parts and proportions of standard gear tooth; (2) Rack meshing with standard gear tooth; (3) Conventional drawing of spur gear, introducing pitch diameter, width of face, number of teeth, and center distance as features of calculation; (4) Drawing of a hub and arm gear introducing standard practice in proportions, and sectional representation of various parts of gear.

Sheet No. 8—Studies in bevel gearing.

(1) Diagrammatic layout of bevel gear, giving names of elements; (2) Drawing giving all necessary information for making and cutting a pair of bevel gears.

Sheet No. 9—Assembly drawing of a machine part, giving all dimensions necessary for assembling and installations.

Suggested Problems—Face plate, machinists' jack.

Sheet No. 10—Freehand sketching of machine parts with necessary working dimensions given.

This sheet need not be inked. Simply to give student practice in making rough sketches of machine parts.

Suggested Problems—Compound tool rest on machine lathe, tail stock on woodworking lathe.

Sheet No. 11—Make detailed working drawings of problems on sheet No. 10.

SECOND THREE MONTHS, 20 hours per week.

Sheet No. 1—Working drawings of any one of the following pieces of equipment: lathe back rest, milling machine footstock, machinists' vise. Sketches of these problems should be made in students' notebook before working drawing is made.

Sheet No. 2—Problem No. 1.

Drawing of a 4 pitch, 36 tooth, involute or single tooth in mesh with rack; tooth curves laid out to proper form as given in chapters 3 and 4 of gearing text ("Practical Treatise on Gearing"). Meaning of "involute" or "single curve" tooth. While the student is developing this problem he should have access to shop to see such a tooth being cut. Notes are to be entered on this drawing giving the following information:

D. P. of gear drawn.
C. P. of gear drawn.
Whole depth of tooth.
Addendum dimension.
Dedendum dimension.
Clearance dimension.
Outside diameter of gear.
Pitch diameter of gear.
Thickness of tooth at pitch line. All necessary dimensions for machinists and pattern makers on drawing.

Problem No. 2—

Double curve or cycloedal tooth; chapter 7 "Practical Treatise on Gearing." Draw gear and rack, 15 teeth, 2 pitch. Notes on drawing to give:

D. P. of gear.
C. P. of gear.
Whole depth of tooth.
Addendum dimension.
Dedendum dimension.
Clearance dimension.
Outside diameter of gear.
Pitch diameter of gear.
Thickness of tooth at pitch line.

All necessary dimensions for machinists and pattern makers on drawing.

Sheet No. 3—

A gear and pinion drawn; pitch and outside diameter lines for gears only; no teeth drawn in.

Problem—Pinion two to one of gear. Center distance approximately 10″.

Give O. D. of gear.
Give O. D. of pinion.
Give P. D. of gear.
Give P. D. of pinion.
Whole depth tooth gear and pinion.
Addendum gear and pinion.
Dedendum gear and pinion.
Clearance gear and pinion.
Exact distance between centers.

Tooth thickness pitch line gear and pinion. This drawing to give width of face, bore diameter, and all necessary dimensions. State proper number of cutters to be used for gear and pinion.

Sheet No. 4 —

Draw a bevel gear and pinion, chapter 9 and 10 "Practical Treatise on Gearing." Details as follows:

Pinion 15 teeth.
Gear 24 teeth.
Pitch 3.

Tooth development to be shown as in Fig. 22 "Practical Treatise on Gearing." Notes on the drawing are to give:

Cutters for cutting gears.
Angle to set milling machine head.
Side setting for trimming teeth.

Sheet No. 5—

Study of the worm gear in detail. Chapter 2 "Practical Treatise on Gearing." Details of problem are as follows:

Single thread worm.
$\frac{1}{4}$″ lead.

Ratio of R. P. M. of worm to that of gear, 30 to 1, center distance approximately 10″.

Gear and worm properly proportioned as given in text book.

Drawing to give all necessary working dimensions. "Lead" and "pitch" should be understood as used in shop practice. The hob, its uses, and method of making this tool understood.

Notes on the drawing are to give: gears for cutting worm and hob angle to set table for gashing gear; information relative to rounding teeth of hob at corners.

In connection with this problem, student should see a worm wheel and a worm being cut; should understand use of worm and worm wheel device as applied to machine design.

Sheet No. 6—

Elementary study of helical (spiral) gears. Before starting this work the student should be assigned to the study of trigonometric functions as applied to elementary design practice. Various elementary calculations are given introducing sine, co-sine, tangent, and co-tangent.

Study of helical gears, chapters 4, 5, 6, 7, 8, part 2 of "Practical Treatise on Gearing."

Problem—Axis of gears parallel.
R. P. M. of pinion to R. P. M. of gear 1 to 1.
Normal pitch 12.
Angle of spiral 33° 30′.
Drawing to show all necessary dimensions.
Notes on drawing to give:
Proper gears for use on miller in cutting these gears.
Angle for setting miller table.
Designation of cutter used.

THIRD THREE MONTHS, 33 hours per week. This period is devoted to pipe fitting standards and kinematics.

Sheet No. 1—

Make an orthographic sketch and name each of the following fittings:

Globe valve in section.
Cock in section; straightway type.
Expansion joint in section.
Union in section.

All parts of devices to be properly named. These fittings can be taken from the Crane Company (836 So. Michigan Ave., Chicago, Ill.) catalogue. In making these drawings, not only fittings specified should be studied, but whole catalog should be reviewed so that the student understands pipe fittings as a whole, and the function of such equipment when installed.

Sheet No. 2—

Hand rail fittings: Elbows as follows, screwed type: 90°, 45°, 11¼°, 22½°, 5⅝°. Cross, 45° Y branch, double 45° Y branch, S strap, T, return bend, branch T, reducer, bushing, plug, coupling, drop elbow, lock nut, right and left coupling, flanged union, safety valve.

This sheet can be divided into six parts and fittings grouped in these spaces. All names of parts and technical specifications to be entered.

Sheet No. 3—

An isometric drawing of a piping installation, chapter 15 of Gerhard's "Power Plant Engineering." When making this drawing, all of chapter 15 should be carefully studied except that involving advanced mathematics.

The remaining sheets of this period are devoted to kinematics and riveted joint design.

Text: "Elements of Mechanism", by Schwamb and Merrill.

Sheet No. 1—

An eccentric with connecting rods; a heart cam with connecting rod; layout of various positions of cam roll and rod included. Drum cam with connecting rods, layout of various positions of cam roll shown. All of the related text, which does not involve advanced mathematics, should be studied.

Sheet No. 2—

Quick return movement of a machine shop shaper drawn. All related text should be studied.

Sheet No. 3—

The reversing gear of a machine shop planer drawn. All related text should be drawn.

Sheet No. 4—

Riveted Joints—All joints presented in Pratt's "Materials and Construction" to be laid out to scale, according to data presented in the text. Finished working drawings of each joint to be made on this sheet.

FOURTH THREE MONTHS, 33 hours per week. The work during this period is devoted to the study of fixtures as applied to modern machine shop practice.

Text: "Tools, Chucks and Fixtures", by Dowd.

The text is to be followed in the same order as written. Each problem is to be studied and an understanding of the various terms carefully developed.

The design features involved in the various fixtures should be attentively studied in particular.

In connection with the following figures, the student is to describe in writing, and illustrate by properly drawn sketches, how he would do the same job on a tool in the school shop, stating what particular machine tool he will use in doing the work. Sketch must give dimensions of all parts of fixture, stresses calculated where necessary. A complete set of working drawings, including details and assembly, to be made of last problem in each chapter. These drawings to be inked in and properly titled.

Chapter 1—Figures 1, 2, 5, 8, 11, 12.
Chapter 2—Figures 2, 7.
Chapter 3—Figures 3, 4, 6, 7.
Chapter 4—Figures 6, 7, 12.
Chapter 5—Figures 4, 12, 15, 16, 25.
Chapter 6—Figures 1, 2, 9, 15.
Chapter 7—Figures 1, 4, 15, 18.
Chapter 8—Figures 3, 4, 9, 11.
Chapter 10—Figures 1, 3, 6, 10.
Chapter 11—Figures 6, 7.

Chapter 12 dealing with chip disposal should be carefully discussed.

RELATED SUBJECTS.

Machine Shop Practice.

Note 1—During the first 44 lessons the student does no actual work in shop other than sketching. The time is spent in study in the shop classroom and in observation work thru the shop where he should become familiar with the shop machines, tools, and processes as listed in the various lessons.

Actual shop work begins with Lesson No. 45 and continues until the end of first three months. Only enough work is done by the student to acquaint him with some of the most elementary pieces of construction.

FIRST THREE MONTHS, 10 hours per week.

Text: Kaup's "Machine Shop Practice."

See Note 1.

Lesson No. 1—Study of Chapter 1 of text. Study of terms used in shop practice; name of tools and purpose for which used.

Lesson No. 2—Chapter 2 of text. Study of files and their uses. Study of cast iron and steel.

Lesson No. 3—Omit Chapters 4 and 5 of text. Study of scraper and its uses on cylindrical as well as flat surfaces. Red lead and mixture for getting bearing to be understood.

Lessons No. 4 and 5—Study of the vertical and radial drill, including speed changes; method of placing and removing tools; importance of taper on all drill tools. Process of reaming, tapping and pipe tapping, as well as relative size drills used for jobs. Study of U. S. Standard threads, tap drills, and pipe tap drills as found in Machinery's handbook.

Lesson No. 6—Drilling continued; drilling to layout, measuring cutting angle of drill point; counterbores, purpose and how used.

Lesson No. 7—Chapter 8 of text. Study of lathe and its parts. Method of supporting centers, centering, facing, straight and taper turning, thread cutting, including method of setting tools, lubricating cutting tools, lathe filing.

Lessons No. 11, 12 and 13—Chapters 9 and 10. Study of cutting tools for lathes; clearances; cutting edge forms; setting in machine; methods of sharpening tools. Boring tool grinding and setting; the back rest and chuck, and its uses studied. Methods of boring taper tools.

Lessons No. 15, 16, 17 and 18—Chapter 7. Study of the planer and shaper; kind of work done; how movements are produced; cutting tools studied; speed changes; how work is held; names of parts, down cutting and angular work; use of centers; pinch dogs and V blocks.

Lessons No. 19, 20, 21 and 22—Chapter 11. Study of the boring mill. The various types recognized and kinds of work for which each is adapted; kinds of tools

used; production of taper work on boring machines; facing work on horizontal.

Lessons No. 23, 24, 25, 26 and 27—Chapter 12. The miller, plain and universal type; constructive difference, various cutters studied and purpose of each understood. Mounting tools in the miller; the vise; the dividing head.

Lessons No. 28, 29, 30, 31, 32 and 33—Chapter 13. Study of scales, calipers, thread gauges, rules, snap gauges, micrometer calipers, vernier calipers, emery cloth, waste, file cards, threading dies, countersinks, drill gauges, center squares, protractor, surface gauge, center gauge.

Lessons No. 34, 35, 36, 37 and 38—Chapter 15. Grinding, tool grinder, cylindrical grinder, cutter and reamer grinder. Grinding wheels. Grade and grit, specifications, cutting operation of wheel, truing wheel, mounting wheels and work, grinding allowances.

Lessons No. 39 and 40—Chapter 16. Tool steel. Carbon and high speed; hardening; tempering; annealing; case hardening.

Lessons No. 2 and 3—Principals of iron and steel manufacture.

Lesson No. 4—Study of steel. Open hearth, cold rolled, carbon tool steel, high speed steel, "steelite." The use of each in modern shop practice. Each class of material tested on the emery wheel and spark produced.

Lesson No. 5—Temper of steel.

Lesson No. 6—Grindstones. Classifications; speeds; mounting. Oil stones; classification; care of oil stones.

Lessons No. 7, 8, 9, 10 and 11—Detailed study of grinding and buffing processes. Comparison of grading lists of various manufacturers; wheels for grinding various materials. Vitrified, silicate and elastic wheels explained. Truing wheels; the "diamond" and its uses explained and demonstrated. Disk grinding; process, allowances, speeds, attaching abrasive disks. Polishing and buffing; purpose of this work; polishing wheels, mounting and preparing for use.

Lesson No. 12—Exhaust systems used in polishing rooms, elementary features of installation and operation of such a system.

A Typical Rehabilitation Class at Williamson Technical School.

Lessons No. 41, 42, 43 and 44—These lessons are spent in the forge shop. Study of all small tools used; forging as a process understood; purpose of hardening and tempering furnaces. Sketches of the forge and anvil are required.

Lessons No. 45, 46, 47 and 48—Sharpening and use of cape and cold chisel on a standard parallel block.

Lessons No. 49, 50, 51, 52 and 53—Filing the surface of the parallel block covered in previous lessons.

Lessons No. 54, 55 and 56—Drilling a size hole to layout. Drilling a reamed hole to layout and reaming. Drilling, tapping, and threading up a ¼" pipe connection.

Lessons No. 57, 58, 59 and 60—Centering, countersinking, facing, and turning a simple straight shaft to a required diameter.

SECOND THREE MONTHS, 10 hours per week.

Text: Machinery Hand Book.

Lesson No. 1—Lubricants. The greases and oils used in a machine shop to be examined and studied.

Lessons No. 13 to 40—Cutting speeds and feeds. Turning, milling, drilling, planing; calculation of cutting speeds; forms of rapid cutting tools, lubricants for cutting purposes.

Lessons No. 41 to 60—Small equipment of the machine shop. Each of the following pieces of equipment should be studied in detail; the purpose of the component parts is explained; details of operation taken up, and name of each part learned. If time is available each device should be dissembled and assembled for purpose of obtaining a thorough knowledge of it.

The machinist's bench vise.
The shaper vise.
The planer shoe.
Planer centers.
The lathe chuck.
The lathe draw in spindle.
The lathe compound rest.
The lathe taper attachment.

The lathe footstock.
The milling machine dividing head.
Taper gauging devices.
Snap gauges; plug and ring gauges.

PATTERN SHOP PRACTICE, 2 hours per week.
Text: Purfield's "Wood Patternmaking."

The student is not required to do any work in patternmaking. The time is spent in study and observation entirely.

Chapter 1—Omit study of large square, and details concerning saw sharpening.
Chapter 2—Take in full.
Chapter 3—Omit.
Chapter 4 to Chapter 14—Take in full.
Chapter 14—Omitted.
Chapter 15—Work on spur gears; other work omitted.
Chapter 17—Take in full.

FOUNDRY PRACTICE, 1 hour per week.
Text: Tate and Stone's "Foundry Practice."

The time is spent in study and observation entirely; no work is required.

Chapter 1—To and including page 11.
Chapter 2—Omitted.
Chapter 3—Take in full except material on skim gate.
Chapter 4—Take in full.
Chapter 5—Take all except reverberatory furnace.
Chapter 7—Take in full.
Chapter 8—Take in full.
Chapter 11—Take in full study of glossary.

ENGLISH, 2 hours per week.

The aim of this work, thruout the course, is to give power of expression in speaking and writing. They should be able to converse readily and intelligently on commonplace subjects, using good English in so doing. Webster's "English for Business" is used as a text.

MATHEMATICS, 5 hours per week.

Dooley's "Vocational Mathematics", which treats of the practical application of mathematics, is used as a text. Supplementary material is also introduced as it is necessary. This instruction is individual.

STRENGTH OF MATERIALS, 4 hours per week.

The work follows very closely the material presented in Pratt's "Materials and Construction." Supplementary material is introduced as the student finds use for it in work in design in the drawing room.

Mechanical Drawing.

The ouline of the course in Mechanical Drawing for the first nine months is the same as outlined under machine drawing and design. The related practical subjects consist of lectures of ninety minutes each on machine shop work, patternmaking, and foundry practice. In addition to these lectures the student spends twelve hours, arranged in consecutive periods, in the school shop on observation work. The related academic work is the same as outlined under machine drawing and design.

The fourth three months' work in this course covers the elements of marine engine design. Practically all of the men who enter this course do so with the thought of obtaining positions with the various ship building concerns in this section of the country, hence the necessity of outlining the course with this end in view.

FOURTH THREE MONTHS, 33 hours per week.

This period is devoted to elementary marine work and general drafting room practice.

Text: "Practical Marine Engineering", by Dyson.

Sheet No. 1—

The screw propeller; place all notes on drawing as given under "propellers" in text, marking "face", "hub", "leading edge", etc. The layout is to be for a standard propeller, with blade of elliptical form. The related text to be studied where it does not involve advanced mathematics.

Sheets No. 2 and 3—

Valve gears. The layout of Stevenson and Walschaert valve gears made. All notations to appear on the drawings. All valve gears described in the text are studied in connection with these two sheets.

Marine boilers. Front and end view of scotch boiler shown in text to be drawn and all notations entered. All of the material in the text bearing on boilers to be studied.

Sheet No. 5—

Marine steam engine. End view of triple expansion engine with condenser in back framing. All parts to be named. Dimensions may be omitted. All of the material in the text relating to steam engines and turbines is to be studied. The remainder of this period is to be devoted to general drafting practice in the making of machine drawings, the problems to be selected by the instructor.

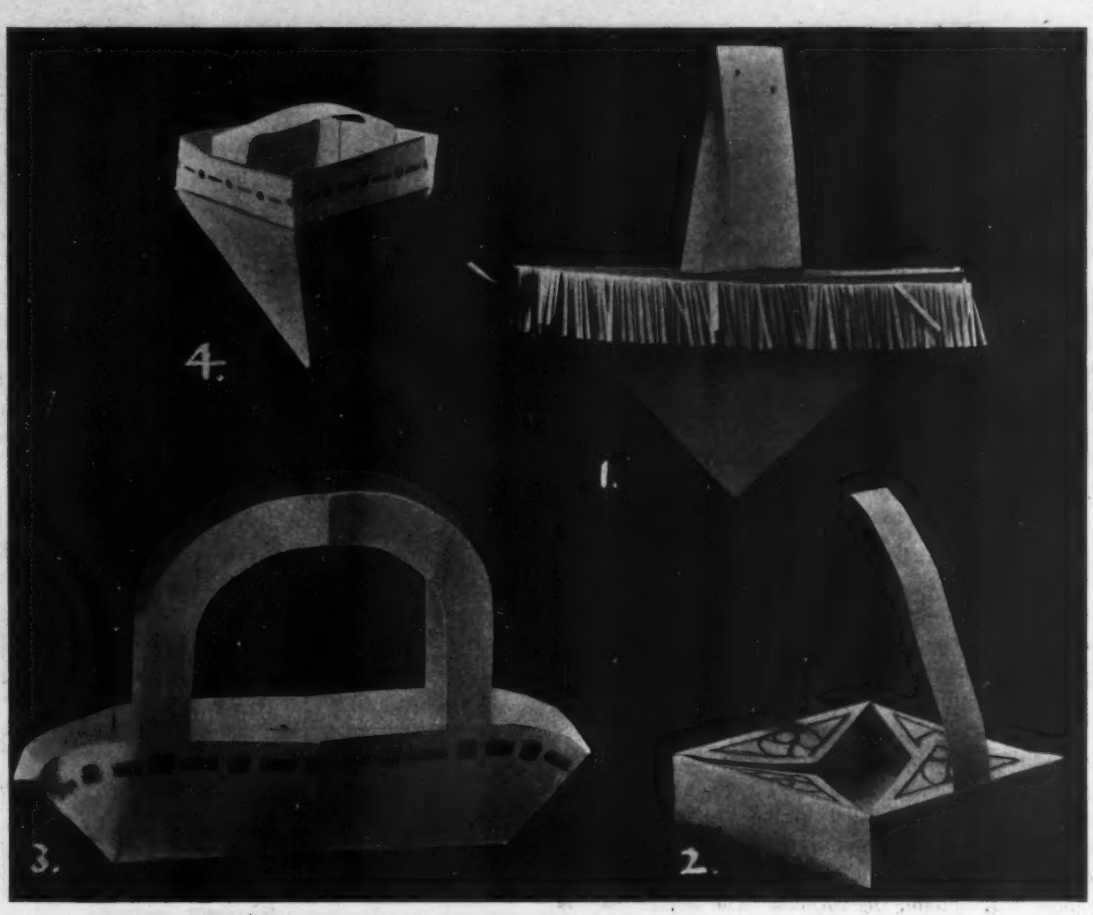
LECTURES, 1½ hours each.

The following course of lectures are given with the thought of acquainting the student with tools, machines, general equipment, etc., used in production work. The lectures are informal and permit discussion by the class. They are given by the instructors in machine and pattern-shop practice.

1. Machine and Forge Shop Practice.
2. Shop record systems; tool checking, stock issue, inspection, and requisition. General machine shop fittings; benches, vises, arbor presses, soda kettles, stock racks and bins, toolroom racks, surface plates.
3. The lathe; purpose and how used in production, features of control. Special forms of the lathe including turret lathe and screw machine discussed in relation to production programs.
4. The planer and its purpose. The shaper.
5. The milling machine; the plain, universal and vertical types discussed in relation to their use in the modern shop.
6. The boring mill and its purpose. Both vertical and horizontal types discussed. The vertical lathe.
7. The grinder; common tool type; plain cylindrical, universal, and tool room type. Function of each in machine shop practice.
8. Forge shop practice, the common equipment. Methods of forging; welding processes. Hardening and tempering. Oxy-acetylene work.
9. Drop forgings. Function of the process in modern manufacture. Details of the method.
10. Jig and fixtures used in machine shop practice. Advantages obtained by use of such equipment. Limitations of the system set by quantity of work to be produced.

Pattern Shop and Foundry Practice.

1. The pattern; materials from which patterns are made; the method of using patterns in the foundry.
2. The mould; how made; molding sand and how prepared; parts of the mould; how pattern is removed from the mould.
3. The cupola; how iron is melted and placed in mould; removing casting from mould.
4. Pattern shop equipment; bench and vise; small tool equipment; jointers, surfacers; lathes. Purpose for which each is used in pattern shop.
5. Miscellaneous pattern shop equipment, including glue heaters, sanders, air chipping hammers, trimmer, and universal saw bench.
6. Pattern shop systems; tool checking; lumber charge; inspection, and requisition.
7. Foundry equipment; flasks, clamps, benches, gaggers, rammers, brushes, swabs, moulder's tools, ladles.
8. Green and dry sand moulding. Cores and use of same; details concerning making of cores.
9. Sweep work in the foundry; reason for use of sweeps; description of process.
10. The moulding machine; purpose; details of construction and operation.



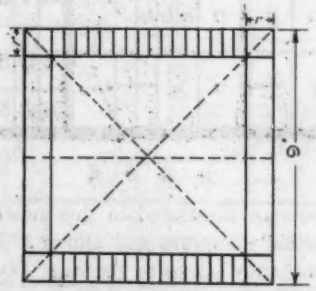
Baskets Made by the Author's Pupils.

MAY BASKETS

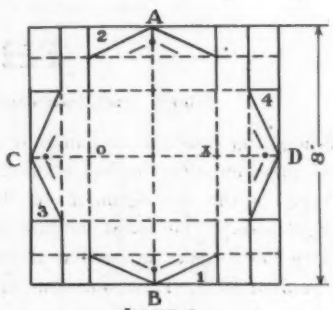
Miss S. E. E. Hammond, Springfield, Mass.

Basket No. 1.

FOLD the nine inch square on the two diagonals and one horizontal. (Illus. 1) Draw one inch border entirely around the square. Cut off the two strips that are at right angles to the horizontal fold. Color any bright color the remaining strips and slash as shown in the illustration. Fold down the slashed oblongs. Use one of the strips 1″x9″ for the handle. Fold the basket



ILLUS. 1

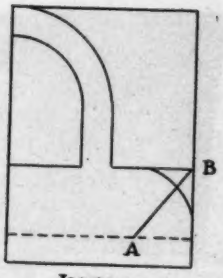


ILLUS. 2

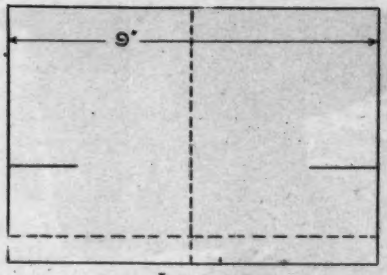
on the horizontal crease and lap the edges of this fold. Place the two ends of the handle between the laps and fasten all with a paper fastener.

Basket No. 2.

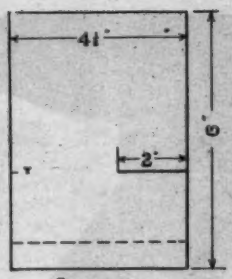
Fold the eight inch square as shown in Illustration 2 and cut on the folds as indicated. To cut the triangles draw the lines 1, 2, 3, and 4. Fold on the crease



ILLUS. 3C



ILLUS. 3B



ILLUS. 3A

AB and cut on the lines 1 and 2. Fold on the crease CD and cut on the lines 3 and 4. Apply the design. The lines o and x may be cut and the ends of the handle, a strip ¾"x11", slipped thru and pasted on the outside of the basket or the handle may be pasted inside the basket omitting the cutting. Paste the oblongs on the outside of the basket.

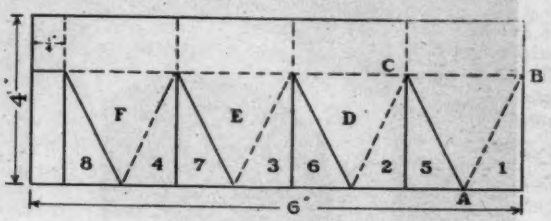
Basket No. 3.

Paper 9"x12" is to be used.

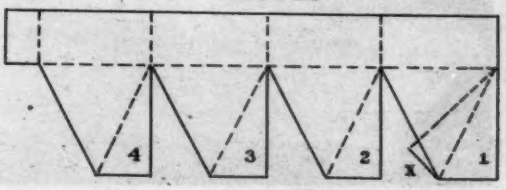
Fold the nine inch edges together. Keep folded and fold the six inch edges together. The paper is now 4½"x6". (Illus. 3a). Unfold the last fold and fold up the folded nine inch edge about ¾" wide. (Illus. 3b). Unfold the ¾" fold and refold as in Illus. 3a. Holding the six inch fold cut about two inches in on the opposite side a little below the middle. (Illus. 3a). Place the edge of the ruler to the two inch cut and mark the point X. From this point cut in leaving the width of the handle. Cut handle (Illus. 3c). Cut the diagonal AB. Round the corners. The design may be with crayon or pegs. Recrease the folds and paste.

Basket No. 4.

Fold the 4"x6" strip into four equal parts allowing ¼" at one end. (Illus. 4a). Measure and fold a band ¾" wide at the top. Cut the folds as shown in Illustration 4a. Place edge of ruler to points A and B and pull the triangle 1 up against the ruler. Crease well. Place the ruler to points C and A and draw line. Repeat the same for D, E, and F. Cut off triangles 5, 6, 7, and 8. Fold triangle 1 back on large triangle and



ILLUS. 4A



ILLUS. 4B

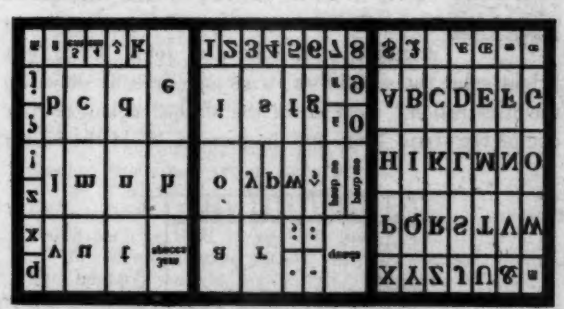
cut off the extending part. (Illus. 4B). Repeat for triangles 2, 3 and 4. Apply design to the ¾" strip. Paste triangles and lap. The strip for the handle is ¾"x11" the ends of which are pasted on the inside of the basket.

THE TYPE CASE

John N. Deal, Instructor in Printing, Jefferson High School, Rochester, N. Y.

ONE of the problems to confront the student of printing after he has studied a piece of type, is the arrangement or "lay" of the type case. The usual method has been to give the student an outline of the type case with letters printed in their various compartments not as the type looks but as the type appears after it has been printed.

The average boy seems to grasp the fact that the type must be in reverse but the type itself is a puzzle to him and continues to be for some time. He has to learn the arrangement of the type case and then unlearn a certain portion of it, in so far as the piece of type itself is concerned. He must take the puzzle of the type and work it out at the type case and in setting up.



Copyright, John L. Deal

The type case illustrated in this article shows the type as it actually appears and allows a discussion in the classroom before going to the case. Questions can be taken up and discussed and a fair amount of knowl-

edge instilled in the pupil. It brings the difficulties right down to the outline of the case and allows mass instruction instead of the trial and error method.

When this outline was submitted to the first class the try-out did not seem to be as successful as anticipated by the author, but as day after day passed the conclusion was reached that this method proved its usefulness, both as a time saver and a method of instruction. Our old "friends" the b d p and q appear in the illustration about as they should appear if each were separately, and in turn, held in the hand. These letters are drawings from photographic reproductions. The following rule has been of assistance in enabling the student to familiarize himself with these letters:

The nick indicates the bottom of a letter.

Hold the nick away from you.

Stem	*Lobe*
d—away from nick.	d—toward left.
b—away from nick.	b—toward right.
p—toward nick.	p—toward right.
q—toward nick.	q—toward left.

The boy can soon learn to describe any of these letters in two words; as d away, right; q toward, left.

The outline of the case was made by offsetting the alphabet on the platen of the job press and then taking an offset impression on a sheet of dry proofing paper. These letters were pasted in the respective boxes and then a zinc etching made.

AN ELECTRIC MOTOR

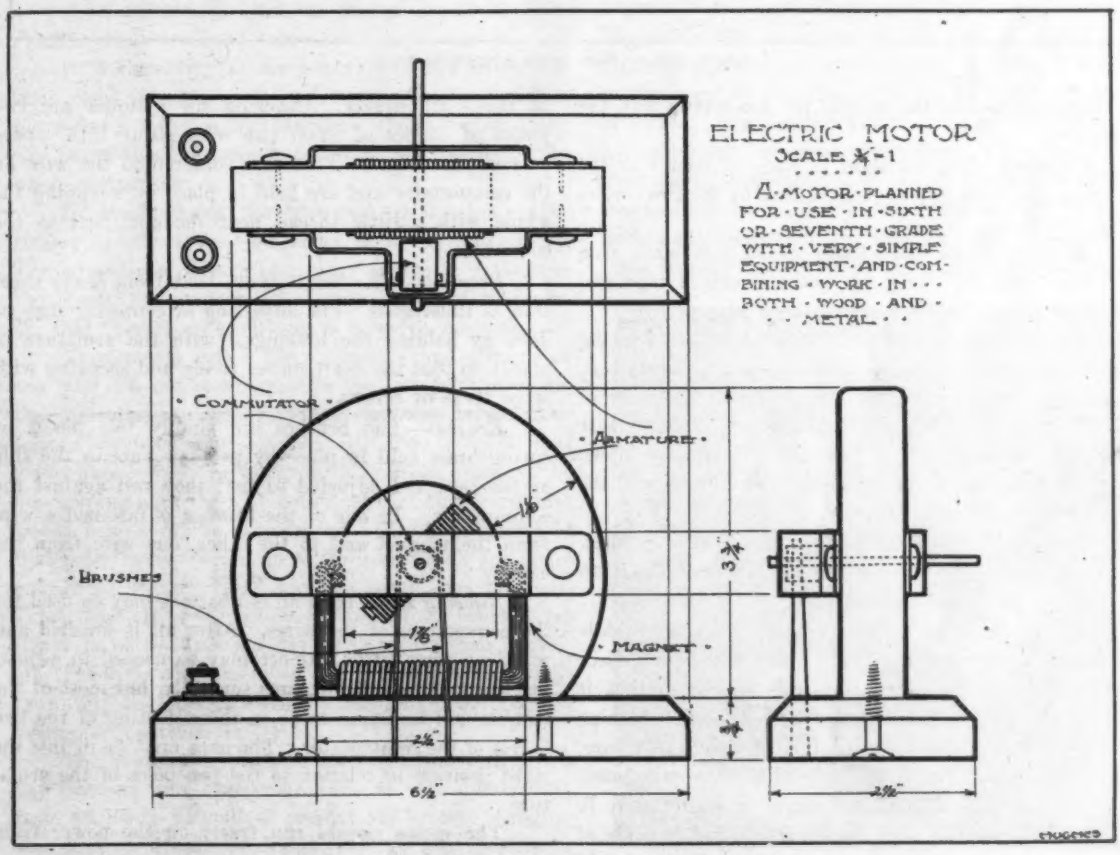
F. C. Hughes, Instructor in Manual Training, Spokane, Washington.

THE motor illustrated and described in this article was planned by the author along with several other electrical models in compliance with an almost incessant demand for something of a mechanical nature that would be within the range of the boys of the sixth and seventh grades. The boy of this age wants to make something that will move. He is also very much interested in electricity.

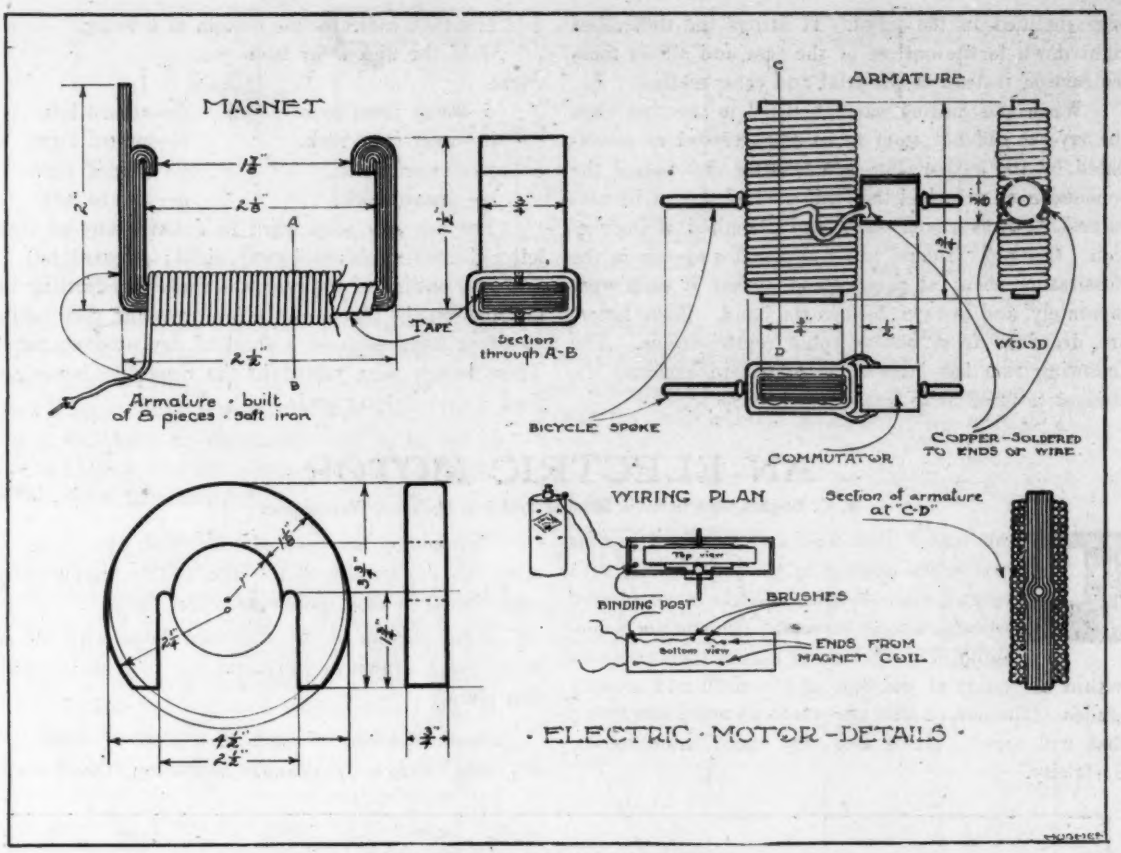
This motor has been planned with two things in mind: the boy's ability at this age, and the simple equipment found in most grammar school shops.

A comparison of the directions below with the accompanying drawings will make the plan of construction plain.

Base—The base is made of a piece of wood ¾" x 2¼" x 6½" with a ¼" chamfer at the top. Two holes 3"



Assembly of Motor (Details on Page 198).



Details of Motor Built by the Author's Students.

apart are drilled in the middle for the screws into the standard.

Standard—The standard is made as shown in the drawing and held in place on the base by the two screws from the base.

Magnet—Stock list—Eight pieces soft black iron ¾" wide and 6½" long, one piece of cotton tape and about 30 ft. of No. 19 cotton covered wire.

The magnet is bent as illustrated in the drawing and wound with one layer of cotton tape to insulate it. Over this insulated magnet are wound three layers of No. 19 wire, allowing about five inches of loose wire to project at each end. These ends are to pass down thru the base, one to be attached to one brush and the other to one pole of the battery.

Armature—Stock list—Eight pieces of soft black iron, ¾"x2"long, a piece of cotton tape and about 15 ft. of No. 21 cotton covered wire.

The pieces of iron should be grooved in the middle as shown in the drawing. The shaft which is a piece of bicycle spoke is to go thru this groove so that it fits snugly. The whole is to be insulated with the tape and wound with about three layers of the No. 21 wire, leaving both ends free to be soldered to the commutator.

Commutator—The commutator is really part, in construction at least with the armature and is made of a wooden cylinder ⅜" in diameter. This cylinder should fit the shaft snugly. Covering the cylinder are two pieces of copper of equal size with about 1/16" space between the edges. These are soldered to the wire on the commutator and are held in place by wrapping the whole with a little thread near the end next to the commutator.

Bearings—The bearings are bent from heavy sheet iron as illustrated. The adjusting or centering may be done by holding the bearings, (with the armature in place) so that the shaft moves freely and securing with large tacks or screws.

Brushes—The brushes are simply two pieces of spring brass held in place by two saw cuts in the side of the base and adjusted so that they rest against the commutator. To one of the brushes is fastened a wire from the magnet and to the other, one wire from the battery.

Binding Posts from an old battery may be used for the connections of the wires. After all is finished and wired up some little patience may be needed in adjusting the motor so that it runs smoothly, but most of the trouble will be found to be in the adjusting of the two halves of the commutator. The gaps must be in just the right position in relation to the two poles of the armature.

The motor should run freely on the power from one dry cell battery.

A row of prize-winning houses, six of which were built by Youngstown boys. The house at the left and the one at the right were built in Dayton.

An Interesting Contest in Miniature House Building

M. L. Burris, Director of Industrial Arts, Youngstown, Ohio

WHATEVER may have been the purpose of Ohio Retail Lumber Dealers in offering $500 in cash prizes to the high school boys of the state for the best examples of miniature houses, the contest proved to be a "top-notcher" in educational values.

It is refreshing to see something "new under the sun" come into the shop and more refreshing still to see a dusty room in the basement (built for anything else but a shop) become a center of attraction for the whole community.

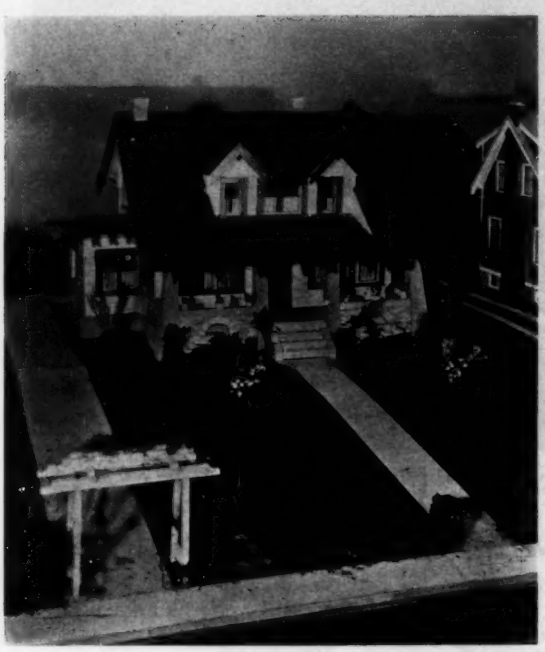
In some schools the boys tackled the job collectively; in others they preferred to work individually. The advantages of each plan were distinctly noticeable. Personally I favor individual work, being of the opinion that "everybody's business is nobody's business."

Youngstown called for volunteers and eliminated any who did not seem equal to the task by presenting the difficulties so strongly that any who lacked confidence dropped out unoffended. The schools that worked collectively called upon the girls to assist in the landscaping with the understanding that any prizes won would belong to the department. Our boys were told that prize money would go to the individuals fortunate enough to win it. This does not mean that the individual builders of the houses derived all the benefits, for the work of construction day by day furnished a valuable lesson to every member of the class, to the extent that every one present learned something of good design and good construction.

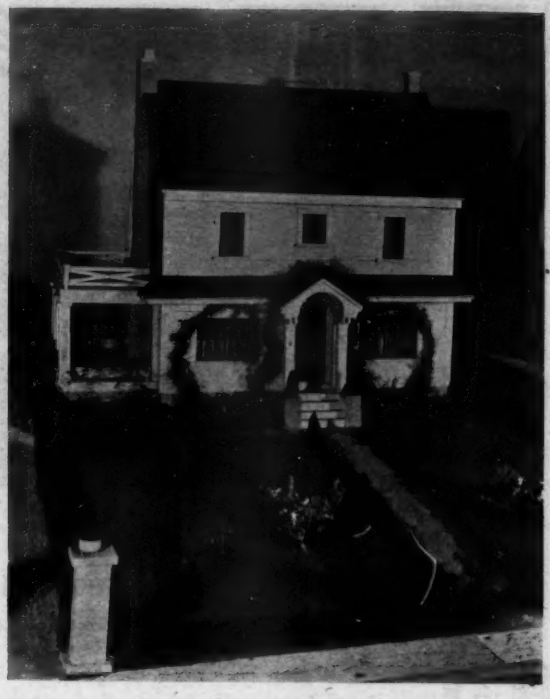
The houses were built to the scale of one inch equals one foot and were exact reproductions of homes costing from $8,000 to $10,000 at present-day prices. Judging was done on a basis of design, construction, fidelity to scale, fidelity to nature, color harmony, landscaping, etc., including every feature that belongs to the home beautiful. Each house was wired for electricity, had shades and curtains at the windows, etc.

The landscaping was a feature that aroused no less interest than the construction of the houses themselves. The committee in charge of the contest placed equal emphasis upon it and were wise in so doing, since it is as important to make the home beautiful without as well as within. Composition board was used as a base, burlap and moss for grass, dyed sponges for hedges and evergreens. Vegetable gardens took the boys to the florists and to the millinery shops, where they were able to find materials that any one with the necessary skill could fashion into whatever the occasion demanded. One

Brick House, built by Paul Ellis, Youngstown. Prize $70.00.



House Built by William Welsh, Youngstown. Prize, $50.



Colonial House Built by Robert Leeworthy, Youngstown, O. Prize, $60.

thing must be kept in mind—every piece of material in the house and in the landscape must be reduced to scale, which required perseverance to put the "difficulties out of countenance and make the seeming impossibilities give way."

Local dealers supplied the materials free of charge, so there was no difficulty to be encountered in this respect, no slow process to be endured. The "show" was staged at Dayton, Ohio, in connection with the Home Building Show, which is an annual event in that progressive city. Each boy whose house was admitted to the show, was present, his expenses being paid by interested organizations of his own city. Owing to the fact that a number of cities dropped out of the contest on account of the short time allowed for completing the models, Youngstown was allowed to enter six of the best she had and as a result carried off $320 of the $500 offered, the remaining $120 going to the Dayton high schools, which exhibited two very fine models. Needless to say the Youngstown boys are proud of their victory, feeling they really have something to "crow about."

The association voted unanimously to have another contest next year, believing it to be of value to their organization and to the public in general. It is hoped to have all the high schools in the state join in the movement. Personally I think it is bound to work wonders in providing better designs, better construction, more interesting landscapes, cleaner streets, greater civic pride, and a degree of happiness for homekeepers hitherto unattained.

STAINING OF WOODS BY THE FUMING METHOD

Ralph G. Waring

THIS method of coloring oak, birch, maple, beech, etc., had its origin some 25 years ago in the shops of Gustav Stickley, The Craftsman. Since then it has had a host of imitators the country over, the most genuine competitors being the members of the Stickley group in New York and Grand Rapids and the Limbert Furniture Co.

The Stickley factories confined their colors chiefly to the nut brown and yellow brown shades as designed by Mr. Stickley from time to time, whereas the Limbert shops went strongly to the deepest red-browns and orange-yellow tones and entirely free from the use of high lighting effects characteristic of the Craftsman Shops of the Stickleys. Refinements of design away from the elephantine proportions of early models made the Craftsman furniture deservedly popular. And no more comfortable, richer or harmonious and useful furniture has ever been designed. With the possible exception of the mahogany designs of the Adams brothers of Revolutionary times, few "period" furniture designs have had the long life and popularity of "mission" furniture of the better type.

Cheap imitations of the Craftsman patterns how-

ever have greatly depreciated the value of the high grade productions, with the result that the Stickleys have gradually worked into other productions in order to furnish new designs and new lines. With the passing of the Craftsman lines from the shops has also gone the fuming method of finishing, which like the Craftsman pieces themselves required very careful manipulation and considerable skill and care in the matching of shades. At the present time very little fumed material is produced, other improved methods having replaced this process.

As originally used, tannic extract, or concentrated chestnut extract, as used for tanning hides is the base of the color. This was reduced with water, the material dumped into a large tank into which assembled furniture was dipped. After drying, the work was sanded smooth, given a color coat of varnish which when dry was followed by a clear coat of the same class of material. This was sanded smooth with a split sandpaper and afterward cleaned up with a special oil coat before sending to the packing room.

Later, instead of dipping the assembled pieces, the various units were dipped separately, and when dry were sanded in an automatic rotary machine which was so adjusted as to high light, or sand off the excess color on those rounded portions where the light would naturally strike the strongest. The piece was then glued up and finished as under the old method.

In any case the method required considerable care and very keen judgment by the foreman finisher in order to produce uniform results. The method did not appeal to the writer very strongly since only the deepest tones could be produced. The fuming box required considerable valuable space and special equipment as to steam coils and exhaust.

The writer has since found, thru research work in the laboratory, that the following method will give uniform results:

1. Reduce concentrated extract in proportion of 4, 5, or 6 volumes of water to one of extract. Keep away any iron and use water which has been run fresh from the faucet for a few minutes before using.

2. Sponge the work to be stained with clear water to open up the pores and raise the grain. When dry sand smooth.

3. Brush on, or sponge on, the tannic acid coat thoroly, being careful to avoid touching up spots of color which may have appeared to have dried prematurely. To do this will deepen the shade.

4. Let dry until just damp, then put into the fuming box and expose to the fumes of ammonia which may be placed in any flat pan of maximum area. It will require about 2 quarts of 28° Be. Ammonia to fill a box approximately 8′x8′x7′. If the piece is damp it will fume more quickly than when dry. If it is not possible to fume when moist, means must be provided whereby steam can be let into the box for a minute or two, just sufficient to make a damp atmosphere, otherwise the results will be uneven. The operator will have to judge his color by some experimental work thru the use of different reductions and different lengths of time. This may be done in a small box fairly air tight and which covers a small pan of ammonia.

5. When the correct color has been reached withdraw the work from the box and give a thin coat of orange shellac, reduced one-half with denatured alcohol. Sand lightly, but smoothly, when the work is dry. Shade up and sap streaks with orange shellac, tinted with alcohol-soluble black and Bismuth brown, yellow or red, to give a brown shellac of fairly deep color. Sand with a split 0000 paper.

6. Brush on a thin coat of Pratt & Lambert Co. No. 61 or Keystone Co. Degrah Varnish. When hard and dry sand smooth and clean up with a mixture of:

1 part varnish, Keystone Degrah,

4 part benzine,

2 part Asphaltum varnish.

Use a cloth to wipe bright and clean. Set aside to harden in a clean, warm room.

Many hours have been spent by the writer in the laboratory on research work in order to overcome this cumbersome tho excellent method of producing fumed oak. The outcome of this has been developed in a product known to the trade as Universal Brown, a water soluble stain which does not raise the grain. It is a natural product in that it has for its source the mine water waste from bituminous coal mines. This crude sludge has been used in its original form for many years as a dye for cloth in the poorer mountain districts of the South. As it is now produced in the purified state in very concentrated form, it is available in ton lots for manufacturers of "oatmeal" wall papers, which are essentially of a raw sawdust surface. As used in the furniture industries it offers an inexpensive medium for matching any or all shades of fumed oak, requires no special box, ammonia, exhaust systems, heating and steam coils, etc., but may be made up quickly as occasion demands. It has the distinct advantage over any other water stain, in that it is the only one which many years of practical research has shown, does not raise the grain of properly sanded work. The richness and far carrying beauty of the clear shade which this color produces have made it a product very acceptable to the furniture industries. It is especially commended to the consideration of industrial teachers who are only too frequently handicapped by the lack of space for equipment and limited funds. Like tradesmen and manufacturers it should be the desire and ambition of industrial teachers to keep abreast of the times and avoid obsolete methods and equipment wherever better ones are offered or suggested.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

GREATER TOLERANCE NEEDED.

The academic man and the vocational man are liable to be each intolerant of the other's point of view. They look upon the school and the matter of education from somewhat different angles. Each is always in danger of too narrow a point of view and of the extremist's attitude.

As a matter of fact, neither can be wholly wrong, just as neither can be wholly and unquestionably right. Neither can get very far in a general scheme of education without the other. Both must admit that each is a necessary factor and that neither is of necessity a malefactor. Both are actuated by the same motives. They seek the same thing, namely, the highest good of "all the children of all the people." *What both need is much more knowledge concerning each other's business.* This would inevitably modify the judgment of each concerning the position and the work of the other.

It is about time for all concerned to arrive at a common understanding and to agree upon a common basis of cooperation and work. The part-time school for the working boys and girls between 14 and 18 years of age offers the best conceivable opportunity for this cooperative effort. Since so much of this part-time work is necessarily of the general continuation or academic character, the academic teachers, especially the administrators, are brought more intimately than ever before into contact with those who are vocationally inclined and who have in many cases left the schools in order to find the types of work which the schools did not offer. When these people come to understand the needs and the points of view of those who come back to the part-time classes and the opportunities which they seek, it is scarcely conceivable that they can fail to become enthusiastic over the idea of vocational education in the schools.

THE WORK THAT COUNTS.

The severest test of education is its influence on conduct outside the school. If the school activities do not carry over into the life outside and do not function in the ordinary interests and activities of boy and girl life when free from the artificial restraints of the school, it is safe to say that they are lacking in the fundamental things that characterize the effective modern curriculum.

One of the greatest reproaches against much of the ordinary manual training work of the past is that it has not, as fully as it should have, influenced the conduct of the pupils in their ordinary home life and social intercourse. In many cases, work done in the school shop has been unrelated to real, conscious needs; and it is all too true that it has not inspired sufficient home work.

Some recent attempts to remedy this shortcoming have come to our notice, which are highly commendable. In addition to the fact that vital, worth while work from the boys' point of view is given, the boys are encouraged in every way to establish home shops and to undertake home projects of every sort. In some cases, bulletin boards are used for the purpose of posting from day to day pictures, drawings, and descriptions of various projects which boys are undertaking or which are suitable for their undertaking.

In this way, the interest has been so developed in some places that the school shop has become more or less a kind of laboratory in which are worked out and tested various phases of constructions needed in the undertakings of the home shops. By this means, the pupils are inspired by the keenest sense of personal or community need and they come to the manual training shop with a purpose and with the most intense desire to get the greatest possible amount of assistance and information. Such work is real work. It ties up as nothing else could the interests of the schools and the life outside.

DEMONSTRATIONS OF TEACHING BY SUPERVISORS.

We surmise that an investigation of the practice of the manual, industrial and vocational supervisors would reveal the fact that illustrative teaching is scarcely regarded as one of their duties, certainly that but little of it is done in actual practice. Various reasons are assigned for this lack, and so in some systems, the teaching staff goes right on from year to year without coming together in a body or in bodies and observing a highly skilled teacher conduct a recitation and afterward discussing the merits and the demerits of such presentation.

This is undoubtedly one of the effective means by which the quality of teaching must be raised. Whether or not the supervisor should do the teaching, or at least a part of it, is perhaps open to question, but it is our profound conviction that he could do nothing so far-reaching in its influence and so productive of needed results, provided, of course, he is himself a highly competent teacher. But whether or not the supervisor does the teaching, the perfectly compelling obligation would seem to rest upon him to see to it that frequent opportunities are provided for his teaching force to observe a superior type of instruction and freely to discuss it.

The ordinary duties of selecting teachers, of purchasing and distributing lumber, nails, glue, and screws, of taking care of items of disturbance and friction, and of preparing courses of study are all very important

and essential, but all of them together are not more important than the intimate supervision and direction of the actual class instruction. Many of the other duties could be performed by an office clerk, but the business of a supervisor as a critic teacher and as a maker of standards of actual class instruction requires adequate preparation, a superb skill, and a profound interest in promoting the technique of teaching. Every supervisor should be a superior teacher and should give his teachers an opportunity to profit by observing his methods of instruction in actual practice.

SHALL UNDERPAID TEACHERS QUIT?

A Good many teachers are now asking advice concerning the question of leaving teaching for more remunerative work. We have no sentimental philosophy which foredooms the teaching profession to pious penury. We do not believe that it is any more the duty of such a group of people to sacrifice their lives "to save society", or "to make the world safe for democracy" or anything of the sort, than it is the duty of society to save the group and to return to them at least a respectable living. If society and democracy are worth saving, their saviors are *at least* entitled to some consideration when rewards are to be distributed.

Besides this, a niggardly course with the "saviors of society", as penurious tightwads are wont to call the teachers, will not save society. That's the point. In the long run, society itself must inevitably suffer the consequences of such a course. So, if we were disposed to argue the matter, we should argue it from the standpoint of social or community interests, not from the standpoint of the individual teachers who are underpaid. Society cannot long stand the strain of injustice and parsimony with its servants.

As for the obligation which the teachers owe the communities in this mater, we cannot see that there is any. We are disposed to tell the teachers to set their prices and to go about in a reasonable but vigorous way to urge the communities to meet their demands. We do not approve the strike method. Many teachers can secure more remunerative work outside the school. We have no compunction whatever in advising such teachers to change to such work, *if, all things considered, it is materially to their advantage.*

It will probably take such an exodus as this to bring school authorities, taxing bodies, and the public in general to their senses. After the good, wide-awake teachers are gone, these functionaries will drowsily comprehend that it has cost them more to fill the places with inferior and inexperienced teachers than it would have cost to keep the highly competent teachers whom their parsimony drove into other pursuits.

But in deciding this question, let us repeat for the benefit of any who are thinking of the change, that the outlook for teachers in the next few years seems promising. It would be wise, therefore, to judge the matter on the basis of, say, a period of five years. If a present offer outside the school may reasonably be expected to hold a distinct advantage over a school position, looking ahead over that period of time, then duty would seem to lie in the direction of the door opening *out* of the teaching business.

Beauty is a great deal more than skin deep, for one of its essential qualities is suitability, fitness. There is, in fact, in suitability a fine and abiding spirit of beauty. The mere fact that a simple kettle is perfectly suited to its work of boiling water over a fire and discharging it hot into another vessel gives it a mysterious and essential dowry of loveliness. So a building that merely fulfils its primary task of protecting and fulfils that task well in all particulars is to that limited extent a work of art, and that art is architecture.—*Frank E. Wallis.*

The teaching of Art should be standardized, at least so far as the presentation of fundamental principles and their application is concerned. Let us stop talking about feeling, and emotion, and atmosphere, and other mysteries, and get down to essential principles. Let us teach something that can be understood by the pupils and parents. We may admit that we do not know much about Art, but that does not prevent us from choosing hats and gowns and rugs and curtains and houses and every commodity that man must use, and that Art should influence. We boastfully affirm, "we know what we like,"—but is what we like good?—*Hugo B. Froehlich.*

Blind Man's Bluff.

Life, New York

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

WRITING DESK—WILLIAM AND MARY PERIOD.

H. P. Gerber

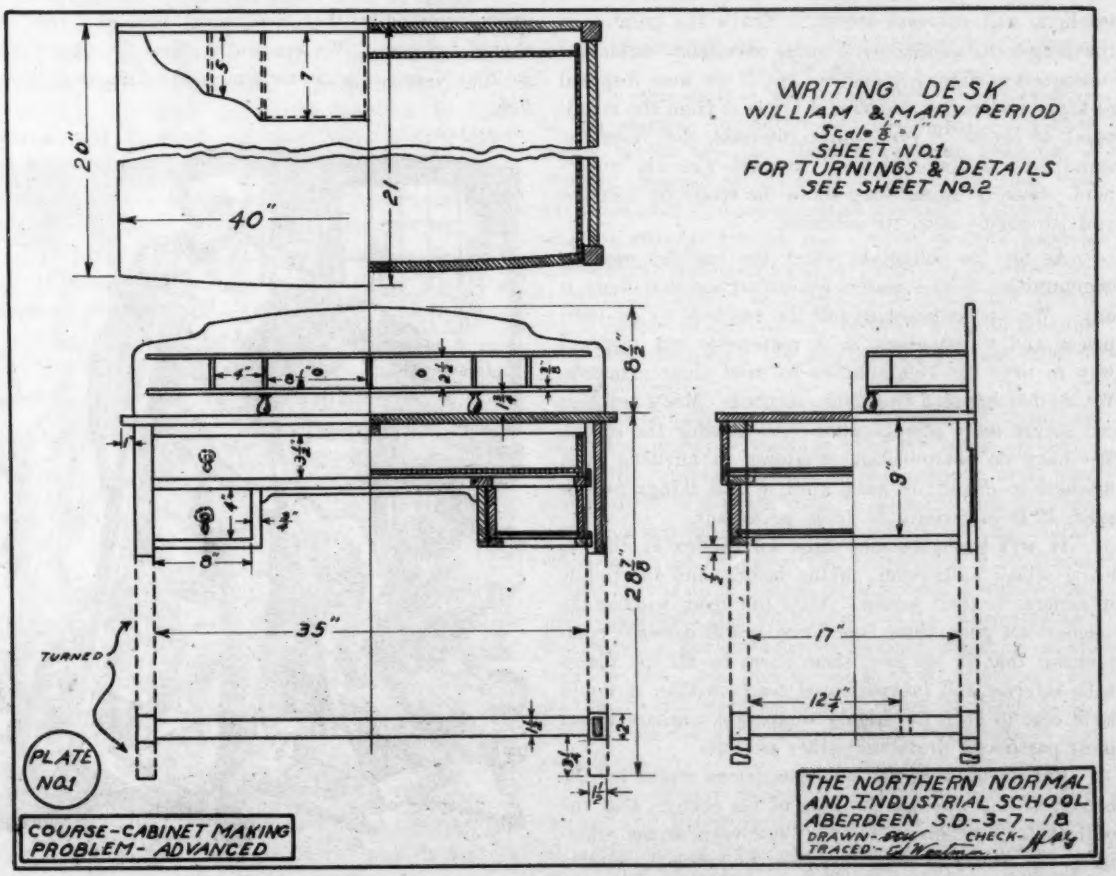
This desk presents an interesting as well as advanced project in turning and cabinet making.

Considering the turning end first, it is well to make a full size drawing of the leg. Plane the four legs carefully to the proper size, then lay out and cut all mortises. In order to turn the legs as called for it will be necessary to build up the centers and lower portion to the size required for turning. After the length, thickness, and location of these pieces have been determined, glue pieces to opposite sides. The following day the edges of these pieces are planed flush with the original leg and wider pieces of the same length are glued to the remaining sides.

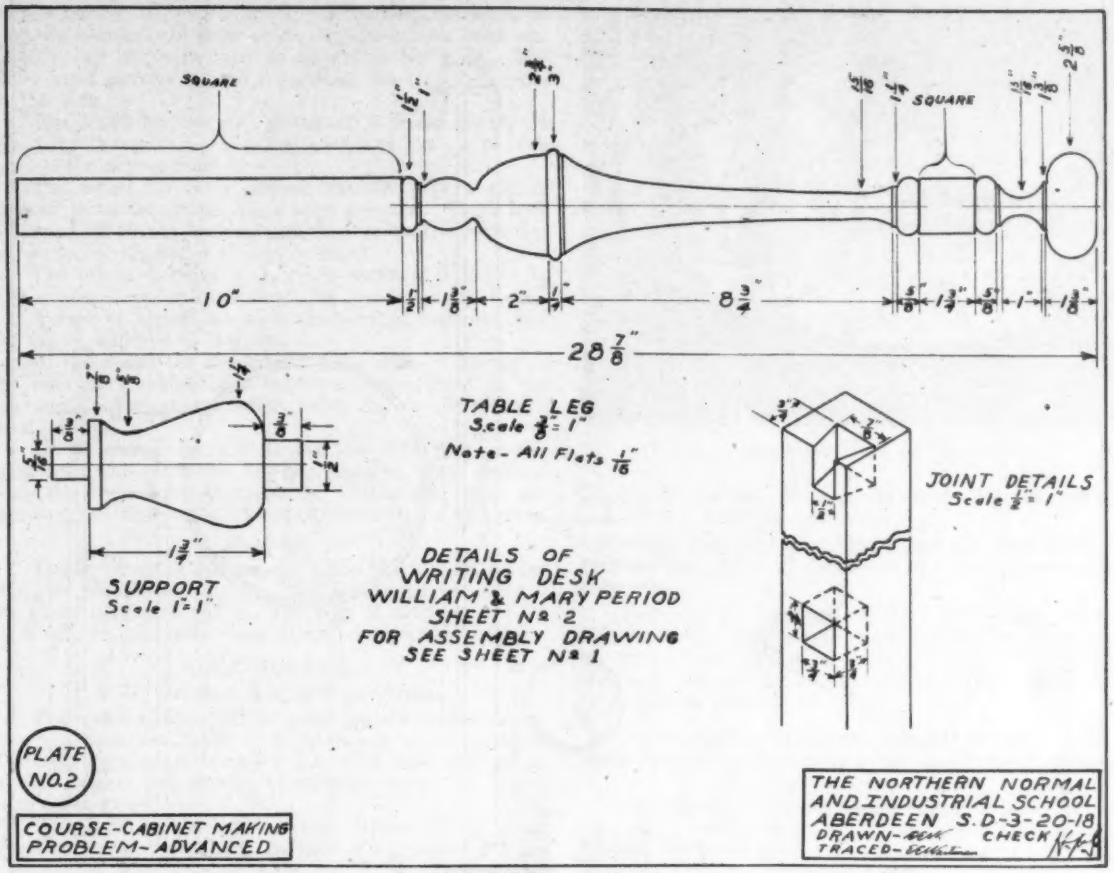
Great care must be exercised in centering the legs in the lathe in order to have the final square portions centered with the turning. Where the turned portions meet the square parts it is well to start the cut at the corners with a fine saw before turning on the power. Care must be employed in turning four legs of a duplicate shape.

The upper drawer front is flush with the small lower drawers at its ends, but the center projects forward one inch. This rounded front is made by sawing out a core of two inch pine and gluing a piece of walnut veneer to the convex side. The material left after sawing may be used as a caul in clamping. After the glue has set,

The Completed Desk.



Details of Desk Made by the Author's Students.



Detail of William and Mary Desk.

smooth up the front, upper and lower edges, and gauge the thickness from the front. Saw on the band saw and smooth up with circular plane or belt sander.

If a shop is equipped with a shaper, a great deal may be added to this design by giving the top a Jacobean edge.

This piece was finished with No. 3 wheeler filler and several coats of rubbing varnish, the final coat being rubbed with pumice and water.

Walnut was used on all exposed parts.

SANDPAPER BLOCKS.

Harold F. Neff, Rochester. N. Y.

In order to do proficient work in the wood working shop it is essential to have sandpaper blocks where they can be found at all times. It is a very simple matter to make them but to keep them in their place has always been a difficult matter.

Last year we made a set of blocks the desired size, bored a hole in each one so they could be hung up. Then we gave each block a coat of bright red stain. The stain was made by mixing red paint with turpentine. After the stain was thoroly dry a thin coat of shellac was applied.

The blocks were then hung in a convenient place on the bench and after ten months of use not one block was missing.

A VARNISH OR SHELLAC CAN.

W. H. Snyder, Jr., Instructor of Sheet Metal Work, High School, Lakewood, Ohio.

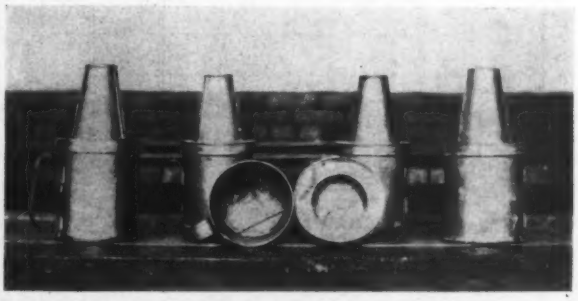
The varnish or shellac can is composed of two parts, namely the can and lid. The can is five inches in diameter, and six inches high. It has a handle which is soldered on in the position shown on the drawing; it has a No. 10 Galv. iron wire around the top; a piece of wire runs thru the inside to wipe the brush on; and the double seam on the bottom, and side seam is soldered on the inside.

The handle is strengthened by folding a 3/16 inch double hem on each side and then recessing it, forming it so that the hem will be on the inside; a full sized cross section of the handle and wire is shown on the drawing at A-A and B-B.

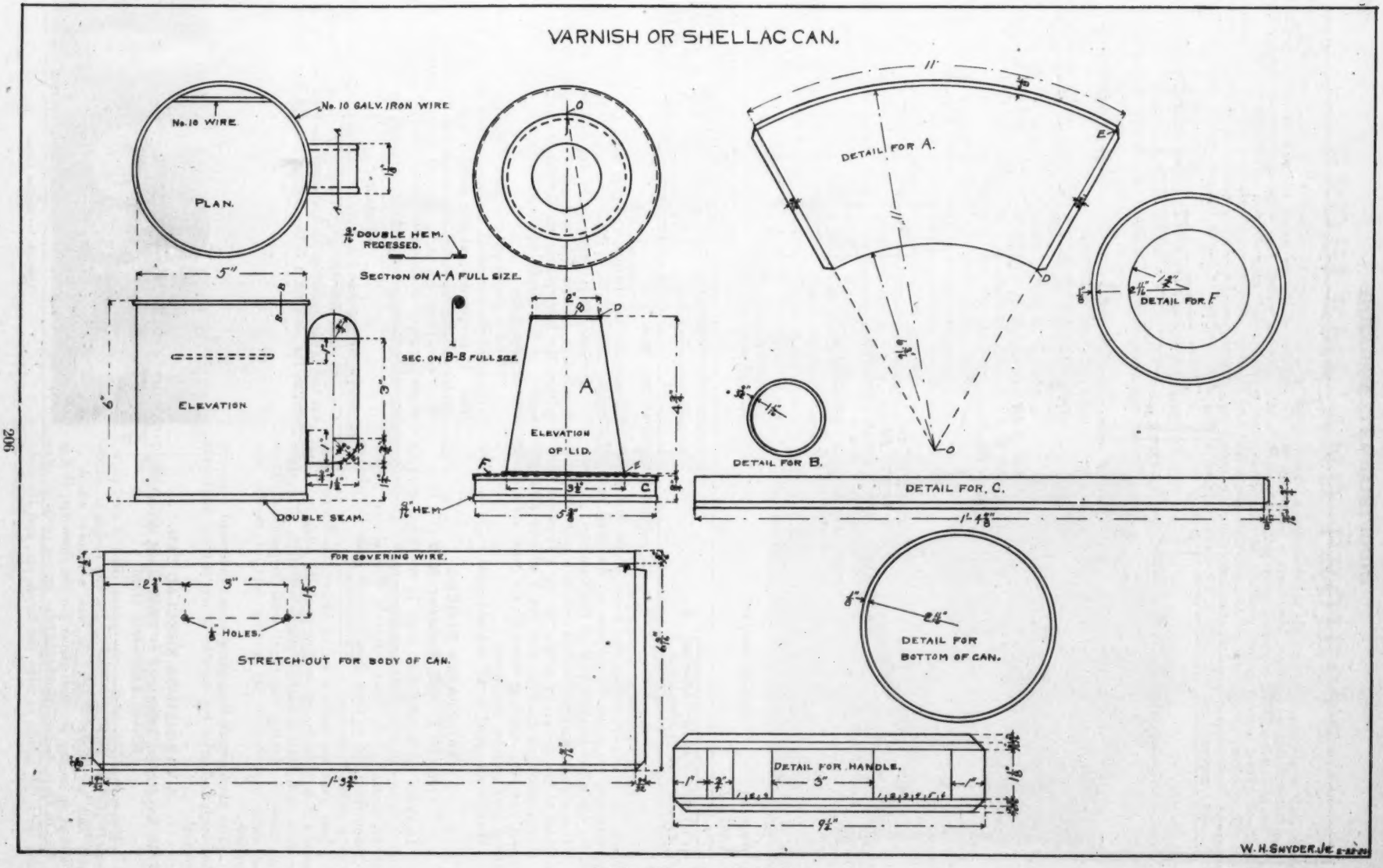
The lid is constructed in such a manner as to provide a place for the handle of the brush, when the can is covered. It is composed of two parts, a rim which fits over the top of the can; this rim has a top like detail at F, which is soldered on to it. Then a flaring piece like that shown at A, is soldered to the top. The detail for the top of the flared piece is shown in detail for B.

Details.

The detail for the body of the can shows all additions of stock for wiring and seaming. The 5/16 inch at the top is for covering No. 10 wire; the 9/32 inch on each end is for making a 3/16 inch seam; and the 3/16 inch



Varnish or Shellac Cans.



Details of Varnish or Shellac Cans.

on the bottom is turned up in the burring machine, so that the bottom will hook on to it; the ¼ inch holes are for slipping the wire thru as shown in the plan. The No. 3 hand groover is used in making the 3/16 inch seam on the side.

The detail for the rim of the lid is shown at C. It is put together with a ½ inch lap joint, and has a 3/16 inch hem on the bottom edge.

The detail for A is seamed together with a ¼ inch grooved seam, using the No. 5 hand groover. The ¼ inch is turned off in the burring machine, so that it rests flat on the top as shown at E, and soldered.

The top of the rim is shown in detail at F. The 3½ inch center is cut out, to admit the handle of the brush. The ¼ inch is turned up with the burring machine, and the top is soldered to the rim.

In the detail for the bottom the ¼ inch is turned in the burring machine; the bottom is then fitted to the can and double seamed, after which the can is soldered on the inside.

In the detail for the handle the 3/16 inch double hems are made with the folding machine, then recessed with the large burring machine. After that they are formed to fit the profile like that shown in the elevation.

Material.

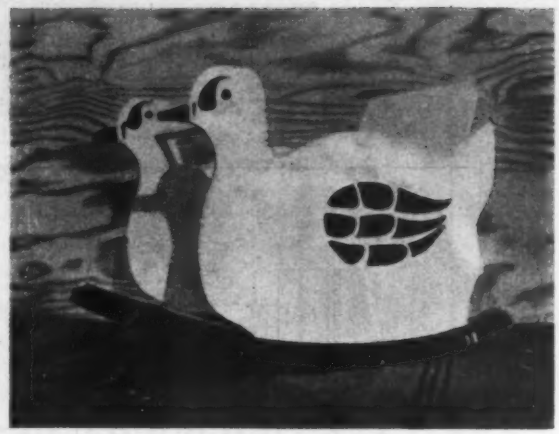
The body of the can may be made of tin plate, leaded plate, or No. 22 oz. copper. The lid should be made of tin plate, or leaded plate. The cost if made of 10 tin plate will be not more than fifteen cents each.

DUCK ROCKER.

C. V. Denman, San Marcos, Texas.

The duck rocker will be most satisfactory if sides, seat and back are made of ⅜" three-ply panel material. Three-ply gum panel is very good. The sides rest on top of the rockers but should be secured with 1¼", No. 6 wood screws.

To reproduce the outline draw either on the panel board or on heavy papers, horizontal and vertical lines forming 1" squares. Plot points in the outline and connect with a draftsman curve.



The Rocker Ready for Use.

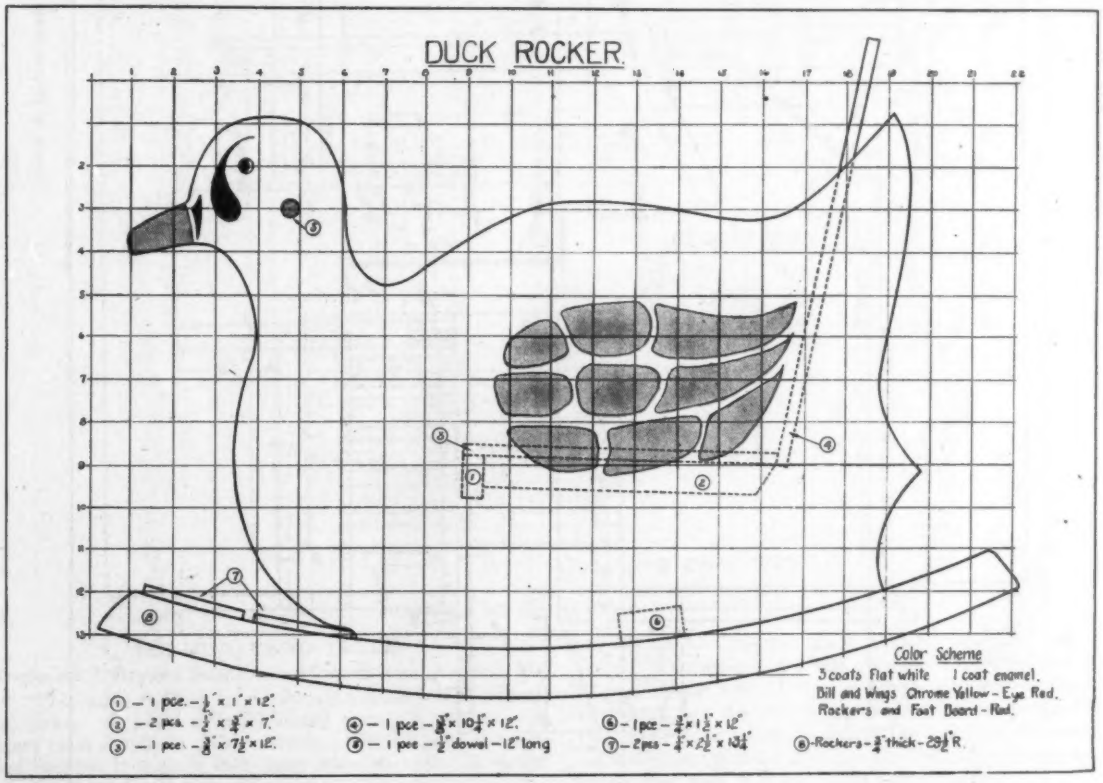
Ample time should be allowed for applying the finish. At least two coats of flat white and one of enamel are necessary.

The bright colors on the head and wings together with the bright red rockers contrast with the white making this a very attractive piece of work. It is entirely practical and serviceable and can be made successfully by an eighth grade boy.

MORRIS CHAIR AND MORRIS ROCKER.

F. W. Ziegenhagen, Instructor in Woodwork, Boys' Technical High School, Milwaukee, Wis.

The Morris chair and rocker illustrated is a popular problem in cabinet making. This problem involves a variety of wood shop practices, namely, mortising, tenon-

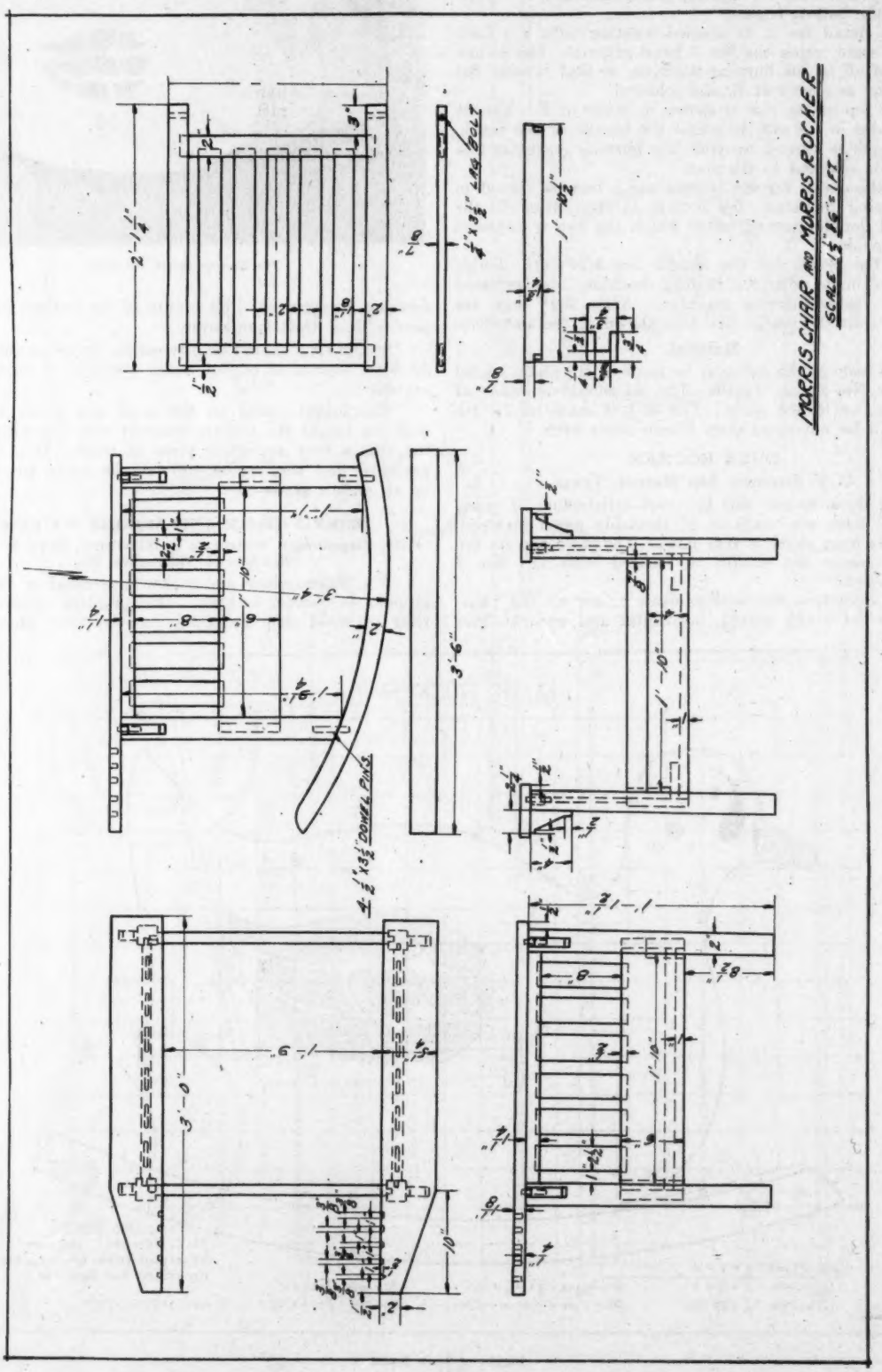

DUCK ROCKER
Color Scheme
3 coats Flat white 1 coat enamel.
Bill and Wings Chrome Yellow - Eye Red.
Rockers and Foot Board - Red.
① — 1 pce. - ½" x 1" x 12".
② — 2 pcs. - ½" x 3½" x 7".
③ — 1 pce. - ⅜" x 7½" x 12".
④ — 1 pce - ¾" x 10¼" x 12".
⑤ — 1 pce - ¾" x 1½" x 12".
⑥ — 1 pce - ½" dowel - 12" long
⑦ — 2 pcs - ¼" x 2½" x 13¼"
⑧ - Rockers - ¾" thick - 29½" R.

Details of Duck Rocker.

ing, and doweling. If a complete set is wanted, that is, chair and rocker, it is necessary to allow enough stock on the legs of the rocker, cutting the legs to the proper radius and length when fitting the rocker to the post. This may be done by either a dowel or a tenon inserted into the rocker.

If a tenon is desired enough should be allowed in the length of the post to fit the tenon in the rocker arm and also in the arm rest on top.

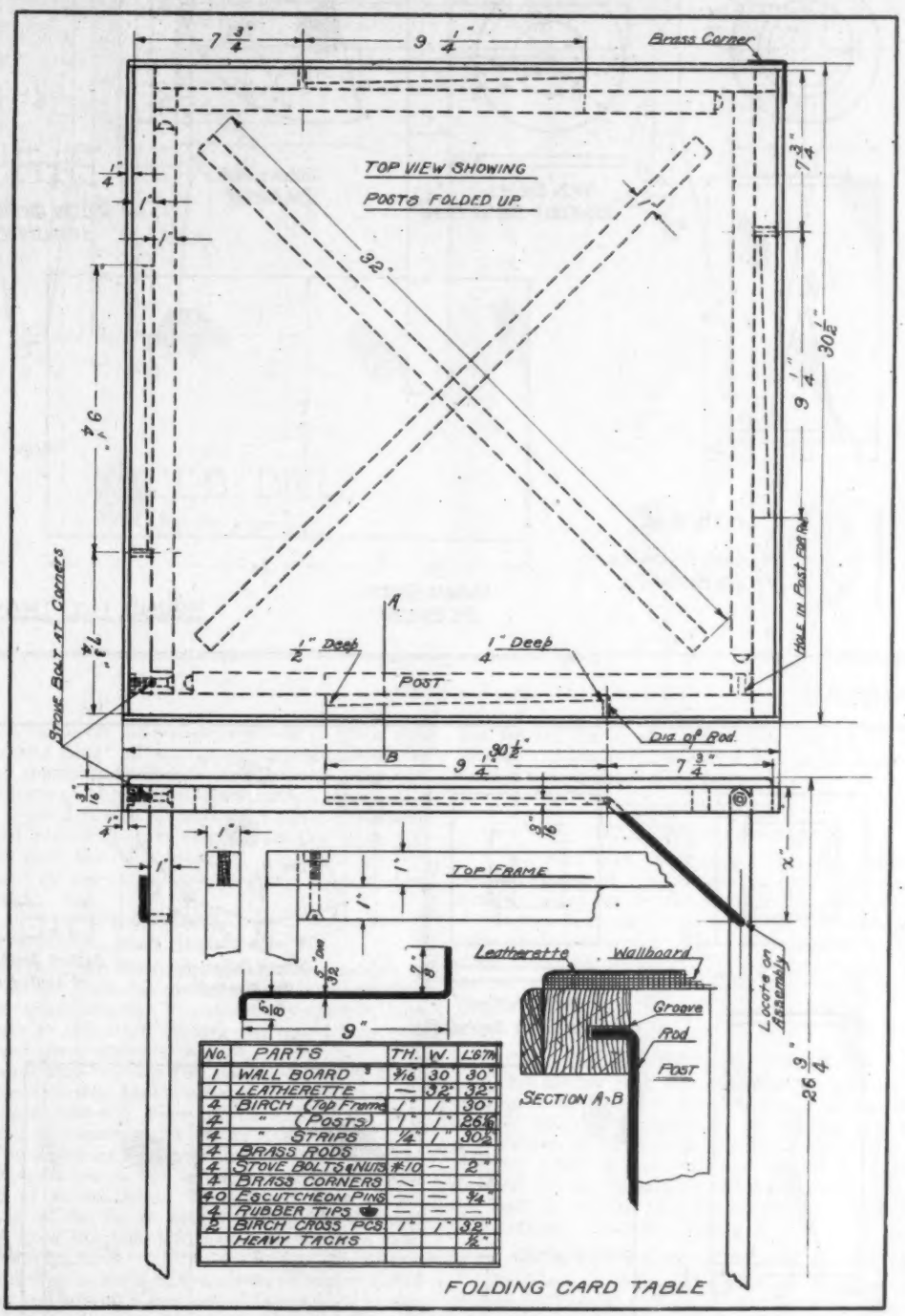
The chair and rocker both involve the same construction with possibly a little more trouble in fitting the rocker arm into the post.



Details of Morris Chair and Rocker.

It will be an advantage to make a full-size sideview of the rocker, in order to give it the proper angle. The chair may be made of white oak or birch, and stained to suit.

The frame is first made up and the corners should be put together securely. The narrow grooves are necessary for the rods to slide in when the table is folded up. The top is fastened to the frame with cold glue and strong



No.	PARTS	TH.	W.	LGTH
1	WALL BOARD	3/16"	30	30"
1	LEATHERETTE	—	32"	32"
4	BIRCH (Top Frame)	1"	1"	30"
4	" (POSTS)	1"	1"	26½
4	" STRIPS	¼"	1"	30½
4	BRASS RODS	—	—	—
4	STOVE BOLTS & NUTS	#10	—	2"
4	BRASS CORNERS	—	—	—
40	ESCUTCHEON PINS	—	—	¾
4	RUBBER TIPS	—	—	—
2	BIRCH CROSS PCS	1"	1"	32"
	HEAVY TACKS			½"

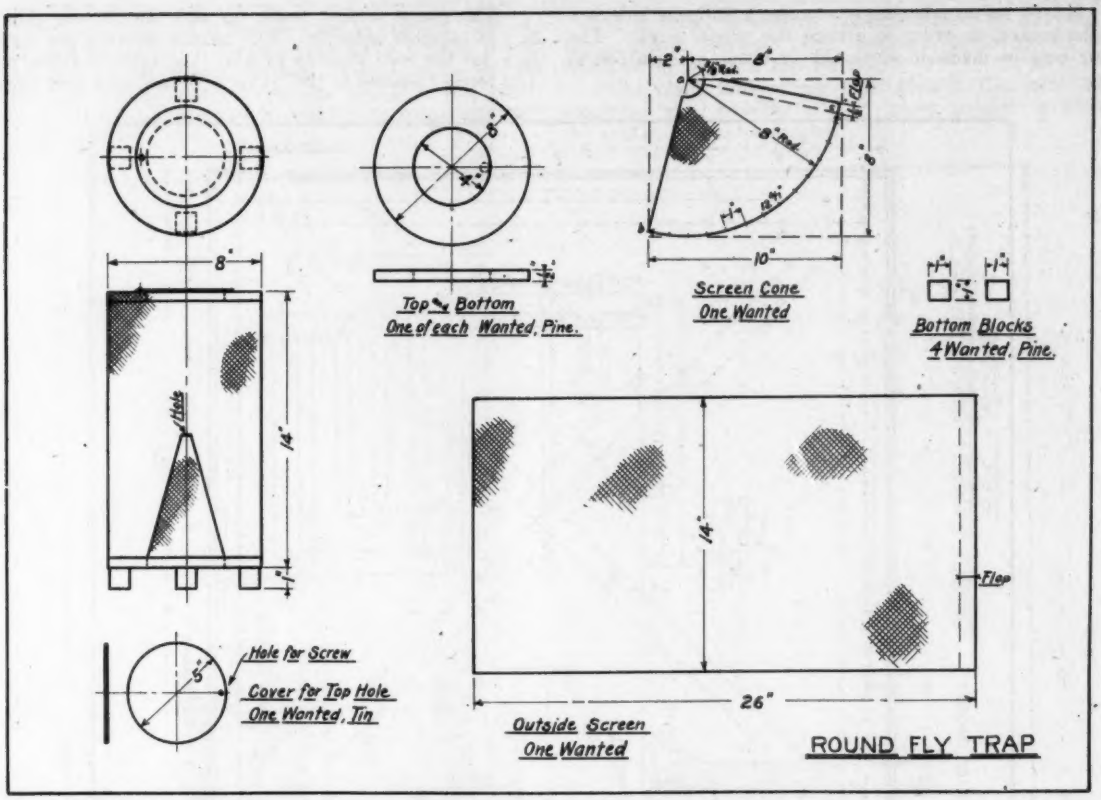
Details and Bill of Materials for Card Table.

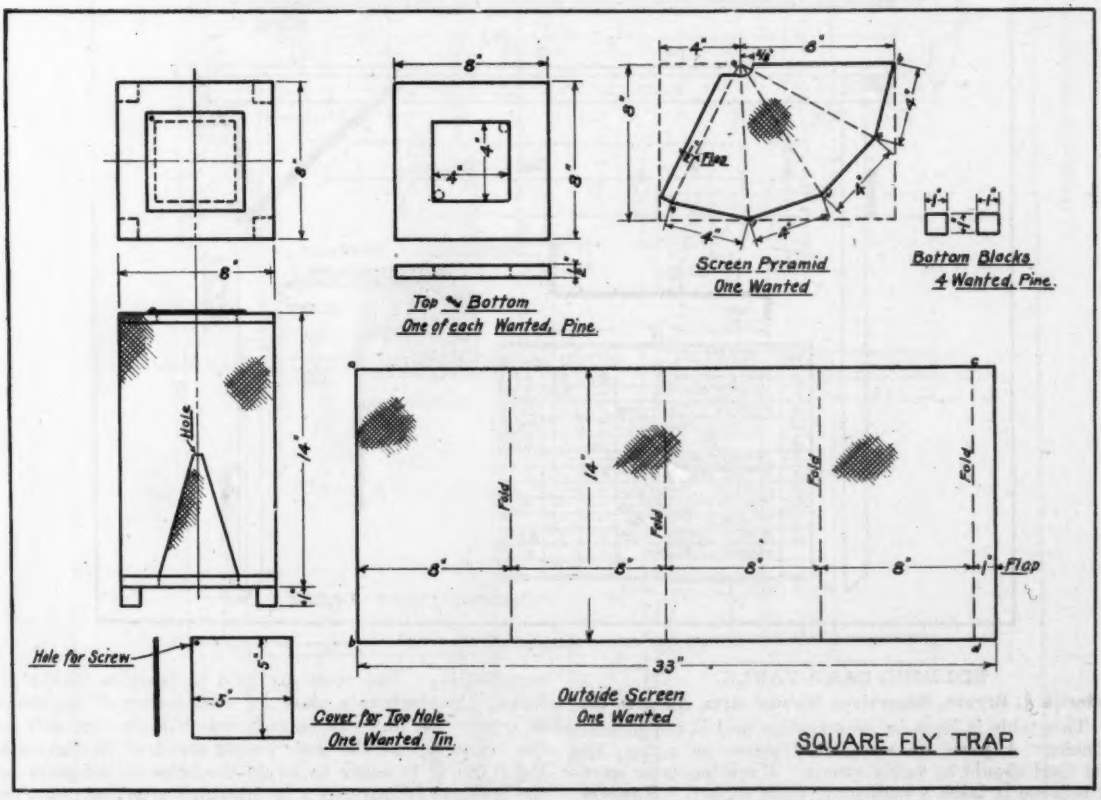
FOLDING CARD TABLE.

Frederick J. Bryant, Supervisor Manual Arts, Auburn, Me.

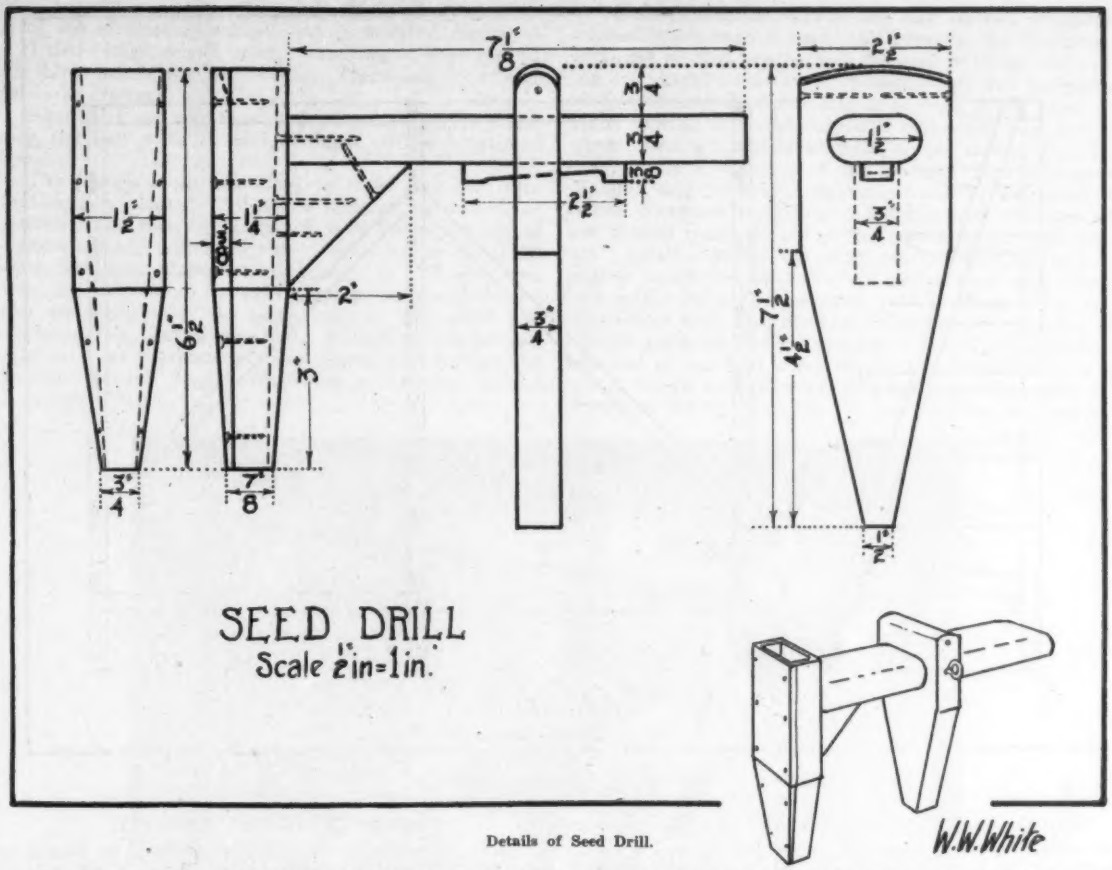
This table is light in construction and is not difficult to make. A piece of wall board serves as a top; the wood used should be fairly strong. Birch has been specified because it takes a mahogany stain so well. However, most any kind of wood will do.

carpet tacks. The posts are held in position with stove bolts. Counterbore a place on each corner of the frame to receive the nut. Brass sash rods will do very well for the brackets. As the posts should stand at 90 degrees to the frame it is better to locate the holes in the posts for the brackets (dimension x in drawing) after the assembly, as all four rods may not bend exactly alike.





Details of Two Fly Traps.



Details of Seed Drill.

The thin strips on the outside are held in place with brass escutcheon pins. Brass corners are suggested for strength and appearance. Felt is commonly used for covering but is just as costly as leatherette, which gives better service and is not troubled by moths. A piece of tonneau material used for automobile tops is just the thing. It need not cost more than one dollar.

Caution: Be sure there are no sharp edges to tear one's clothing.

FLY TRAPS.

Clarence A. Rush, Jacksonville, Ill.

The accompanying drawings represent two models of fly traps which have been successfully built in the writer's classes. The square trap can be successfully made by boys in the seventh to the ninth grades; the round trap even interests upper class students in high school.

The square trap requires two pieces of lumber ¼x8x8 inches, a piece of screen 14x41 inches, a piece of tin about 5 inches square. Several pieces of wood from the shop waste box will be necessary for blocks under the base of the trap. The drawings illustrate the construction. The only difficult operation is the laying out and making of the pyramid of screen wire. It is made clear in the drawing. Lay off the figure with a radius AB, 8 inches long and the lines BC, CD, DF, FG, each 4 inches long. Allow a flap on one side.

The round trap is made of two pieces of lumber ¼x8x8 inches for top and bottom pieces and of four 1 inch blocks. The screen wire will measure 14x34 inches. The top and bottom pieces contain two inch holes cut out with coping saws. The screen wire cone is laid out on the base of a circle with a radius of 8 inches. The top hole of the trap is covered with a flat circle of tin fastened with a handle to act as a hinge or with a wood cover.

In constructing the fly trap it is well to consider that very little bait should be used and that this should be mounted in the cone about half way up. Flies fly up and toward the light, so that the cone should be at the bottom and the possible escape will be downward and toward the dark shadow the base.

SEED DRILL.

W. W. White, Waterloo, Ia.

The high cost of materials for shop work and the practical need of a seed drill in local home and school gardens led to the development of the present project.

It may be made from any available scrap-boards taken from goods boxes, etc. The construction is easily understood from the drawing. The side projection shows one method of holding the piece for measuring the distance between drills, and the sketch shows another.

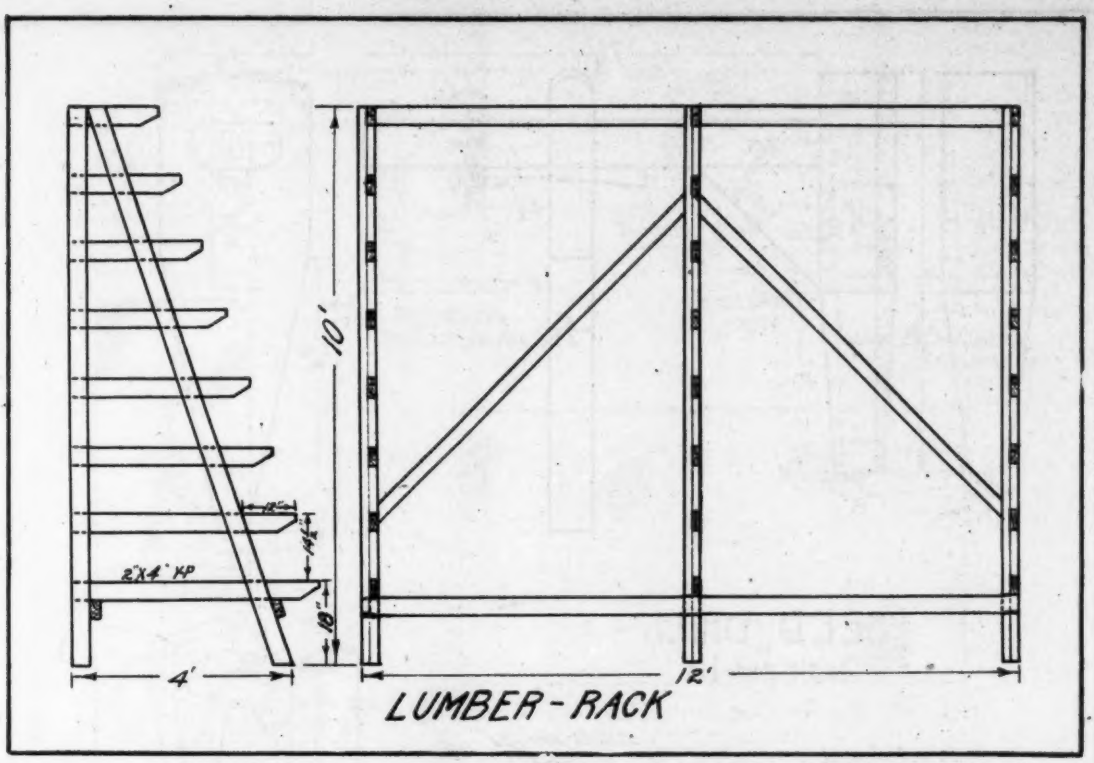
LUMBER RACK.

Paul L. Cressman, Uniontown, Pa.

This lumber rack was built for the purpose of economizing in space and to make the material easily accessigle. It utilizes the space to the ceiling, and makes it possible for us to climb to the top without the use of a ladder. After it was built we decided to cut one-half inch off of the bottom of the back posts thus causing the rack to incline slightly toward the irregular stone wall causing it to take a firm grip.

INDUSTRIAL EDUCATION IN INDIA.

American methods of industrial education are being applied at Lahore College, India, by American missionaries, who are training native workers for the great industrial development, which is taking place in the country. Before the war India depended chiefly on Germany for her chemicals and when her source of supply was cut off, she was left helpless. Factory owners faced shut downs, for altho they had plenty of raw material and plenty of orders they lacked the chemicals which were needed to convert the raw material into the finished product.



Plan of Lumber Rack for School Shop.

Thru the aid of American capital and the Punjab government, a department of industrial chemistry was established in 1916 at Lahore College. Today the department has grown into a series of self-supporting factories, in which the details of various industries can be studied at close range.

Not only are experiments made in the laboratories, but sugar, leather, soap, oils and a large number of chemicals are manufactured and marketed. Two hundred pounds of sugar, a dozen hides, and 200 pounds of toilet soap, are an average daily output. In addition to this, a new plant has just been established for the manufacture of caustic soda and other chemicals by the electrolytic method. Machine design, factory lay out and power transmission are all studied as part of the course.

Students are carefully selected, only those who are connected with some established industrial concern or have capital which they intend to invest in industry, being admitted to the course. During the last two years of work, each man is required to specialize in the industry, which he plans to take up after graduation. In his final thesis, he must give a description of the building and equipment of a factory in the industry. He is also required to describe minutely the machinery for each process of the manufacture of the article, give the source of the raw material and the market in which he expects to sell the finished product. In addition to this he must calculate the cost of the factory itemizing the expenditures.

The course has proved so popular that it has been necessary to turn away many would-be students, in order to keep the numbers small enough to do intensive work. Chemistry which before was of no special significance to the average man, has become definitely linked up with industry. The practical value has been proven, and the native Indian is eager to know all that he can, in order that he may be trained to compete industrially with the other nations of the east.

INDUSTRIAL-ART EXHIBIT.

The Metropolitan Museum of Art held its fourth exhibition of American industrial art from March 1 to 21. The collection of objects and designs which was brought together under the direction of Mr. Richard F. Bach was intended as a demonstration of the practical and trade value of an art museum and as a proof of the educational use which can be made of museum objects for the advantage and improvement of current design in industrial art. Each of the articles shown owed its conception of method or execution to the study of museum originals and a most surprising variety of products as well as designs was shown. The objects and designs included commercial containers, costumes, decorative accessories, enamels, furniture, jewelry, lace, leather work, mantels, metal work, mosaics and glass painted panels, pottery, rugs, silverware, tapestries, textiles, tiles, woodwork, etc. An interesting feature of the exhibit was the fact that every article shown was intended for sale on the open market and was not merely a special production made under circumstances and conditions not ordinarily found in commerce.

HOLD VALUABLE SEWING CONTEST.

A contest that has vitalized the entire instruction in sewing in the schools of Newark, N. J., has been recently concluded. The contest was arranged for through L. M. Bamberger & Company, the leading department store in the city, and consisted entirely of regular school work. For the following account of the contest the *Magazine* is indebted to Miss Carolyn Stephens, Supervisor of Domestic Art in the Newark schools.

The contest was planned along the following lines and prizes were offered to four distinct groups of children.

First—A grand prize for the grade school making the best showing, and first, second, and third prizes for the pupils in each grade doing the best piece of work. About forty schools competed.

Second—A grand prize for the Alternating School making the best showing with first, second, and third

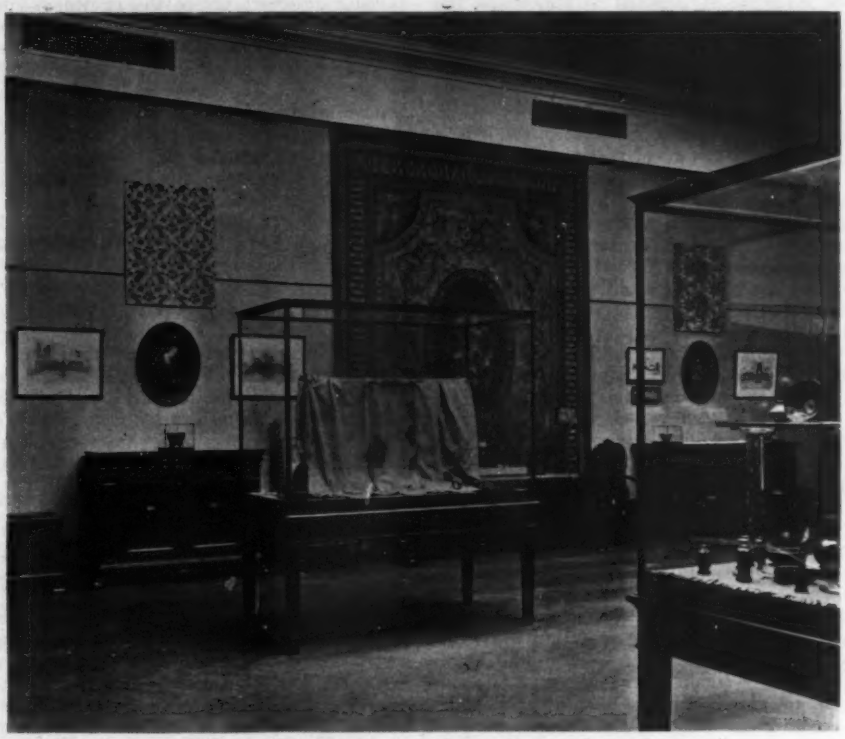
prizes for the pupil in each grade doing the best work. All of the alternating schools, ten in number, competed.

Third—High school prizes consisting of first, second, and third prizes for best work. There are four high schools in Newark.

Fourth—First, second, and third prizes for the pupils doing the best work in each division of the vocational school.

The schools were permitted to make any size contribution they pleased. All of the material submitted for the contest was received in the office of the supervisor of domestic art and was from there forwarded to the Bamberger store to be placed on exhibition. It took nine men several days to put up the exhibit in the store auditorium under the direction of the head director. The effect was very beautiful. Invitations were mailed to educational people all over the state of New Jersey and during the two weeks of the display thousands of visitors studied the children's work.

This plan is so worked out that instead of offering manual work once a week, the program for the year is arranged so that sewing, art, manual training, and cooking are taught to the same children every day for periods of five weeks. For instance, a seventh grade class will study sewing one and one-half hours per day for five weeks; then art will be studied for five weeks, etc. This plan, in the estimation of the teachers, affords a saving of time and improves instruction due to sustained interest, decreased repetition of fundamental processes and less mental readjustment on the part of pupils and teachers. Again, exactly the same amount of time and far greater amount of work is accomplished than was formerly possible under the once per week program. The Burnet School took also the first eighth grade prize for the regular grade problem—a princess slip, ruffle gathered and hemmed by machine attachments, top decorated with original design and trimmed with tatting. The prize was a cabinet sewing machine. A similar prize was awarded



A Bit of the Industrial Arts Exhibit at the Metropolitan Museum.

The exhibits of the grade and alternating schools were in strong contrast. In the grade schools the teaching is done by the classroom teachers and consequently, of course, is pretty uniform. Set problems for each grade are worked out under instructions given by the supervisor at regularly stated grade meetings and in office conferences. The lessons occur once a week for a period of a year or a year and a half.

In the alternating schools the teaching is done by specially trained teachers and the pupils receive instruction every day in cycles of ten or twelve weeks. The teachers follow a general policy of teaching methods and processes, but a greater variety of problems is offered suited to the child in the school and in the particular community in which she lives.

It is interesting to note that the grade school which received the grand prize, a full length bronze statue of Lincoln mounted on a pedestal, was the Burnet School. This school belongs to a small group in which the manual activities are conducted on the plan of intensive instruction.

the Abington Alternating School for a graduating dress of cotton poplin, exquisitely decorated with an original design.

In the Newark Sewing Course all decorations which the girls apply to their sewing projects are original. All trimmings used are hand made. Hundreds of varieties of crocheted edgings appear on the underwear made by the children and many of the edgings are invented by the little workers themselves.

The alternating school which took the grand prize showed besides many graduating dresses, lawn dresses, coats and hats, small children's dresses and hats, an exquisite luncheon set worked by seventeen girls, which looked exactly as if only one hand had touched it, a braided wool rug, small children's aprons with appliqued designs, etc.

The Cleveland Alternating School had a showing of several hundred garments including all the model underclothing needed for a child of five and a child of twelve, with many varieties of dresses. This school had an exquisite set of smocked blouses with various colors and designs.

One of the most satisfactory incidents of the contest was the awarding of the first seventh-grade prize to a little girl who from birth has had but one hand. The grade problem was a middy blouse, and this child made an exquisite garment far exceeding in beauty those made by her more fortunate schoolmates. Several years ago when this little girl was in a fifth grade and the rest of her class was beginning to learn to sew, she sat in the back of the room with the tears streaming down her cheeks. A visiting supervisor of domestic art said to the teacher, "Is this child being punished?" "No," said the teacher, "but she cannot sew. She has but one hand." "Oh! said the supervisor, "that makes no difference at all. I can teach her to sew." And she did. The child was made very happy with a beautiful Martha Washington Mahogany sewing table, the first prize for seventh grade work.

The Bamberger firm spent over two thousand dollars in prizes and showed the keenest interest in stimulating the efforts of the children of Newark to appreciate the opportunities for learning this useful art.

DETROIT MANUAL TRAINING CLUB HEARS TALK ON LIBERTY MOTOR.

The activities of the Detroit Manual Training Club this year have been largely of a social nature. A bright Saturday in October found the members enjoying an outing at a club house on Lake St. Clair, where, a field meet, ball game and boat race gave all good appetites for the chicken dinner. In December, a trip thru the Morgan and Wright plant proved very interesting and instructive, enabling the club members to get a good insight into the processes involved in making automobile tires. In January, a Hard Times Party, with supper, dancing and "stunts" proved a great success.

The Club was especially fortunate in securing as a speaker, Harold H. Emmons, of Detroit, who during the war had charge of the production of all the Liberty Motors for Uncle Sam and the Allies. Mr. Emmons spoke to the Club at the Class Technical High School on March 5, bringing to all who heard him a better understanding of the seemingly unsurmountable obstacles which were met and overcome not only in performing the unparalleled feat of developing on short notice this master engine but also doing what the English and French authorities asserted could never be done—putting the manufacture of an aircraft motor on a production basis.

A brief survey of the status of the airplane in this country prior to the war, reveals the fact that altho the airplane had its birth in this country, some of the European countries were more alert and more progressive in its development than ours, with the result that at the time the war broke out, our army had but meager preparation and had nearly everything to learn in aviation. As the war progressed and the demand for planes increased, the Allies bought from every factory "everything that would stay in the air." When a commission was sent to Europe from this country in 1917, it was found that the French and English alone were using 83 different types of planes and almost as great a variety of aircraft motors. The urgent need of one standard type of motor became more and more apparent. The development and production of this motor was taken over by the United States and proved to be one of our most valuable contributions toward winning the war.

The plan was, first, to have an "All-American" motor, uniting the best elements found in all the American motors as well as some of other origin; second, to so standardize the motor that the parts made in one plant would be interchangeable with similar parts made in all the other plants. Altogether there were 79 plants turning out parts and five plants building the motors ready for use. The latter group includes the Ford Motor Co., Packard Co., Cadillac Co., Lincoln Co., and the Nordyke and Marmon Co. One of the most remarkable accomplishments in the motor world was the designing and building of the first motor in six weeks' time. Moreover, the design proved to be so satisfactory that no changes have been made in it with the exception of one detail—a change in the lubricating system.

A few facts in connection with the production of the motor will indicate what was accomplished. At the time the armistice was signed, 101,000 Liberty Motors of the several sizes (4, 6, 8 and 12 cylinders) were either completed or in the course of construction. The first order was for 20,000 motors. Delivery of completed motors was being made at the rate of 220 a day by the time the armistice was signed. Comparing this rate of production with the rate in England, 70 motors a week of the leading type, gives some idea of the magnitude of the undertaking in this country.

In addition to giving many interesting details regarding the design, production and performance of the Liberty Engine as it is officially designated, Mr. Emmons also showed how the characteristic American initiative and resourcefulness solved many perplexing problems in obtaining on short notice the enormous quantities of materials such as spruce, linen, "dope" for painting the planes and castor oil for lubricating the motors, to say nothing of the 57 different kinds of instruments needed on airplanes. The situation in lubricating oil is an illustration of the complexity of the problem of supplying the demand for materials. Up to twenty years ago, the castor bean was cultivated in this country but in recent years it has been found cheaper to buy the supply in India. When the war broke out and this supply was no longer available in this country, we were left with a small fraction of the usual supply but with a very greatly increased demand. A shipload of beans was finally secured from India, however, and distributed to farmers in this country for use as seed. Before the harvest was ready, a very curious circumstance presented itself. It would have been laughable had it not been so serious a matter at the time. The beans, it seems, were of half a dozen different varieties and the 23,000 farmers who planted the seeds had castor bean trees ranging in size from the dwarf, about four feet high, to the larger varieties twenty feet or more in height and including types requiring altogether different methods of harvesting.

Thus, in a great many instances, it was not merely a matter of going into the open market and buying what was needed but of actually creating the supply. In getting a supply of "dope" for coating the planes, it was found impossible to buy in this country more than about ten per cent of the amount needed. As a result, plants costing $20,000 were built in order to insure a supply. To overcome the lack of linen, a new fabric had to be developed. A certain variety of cotton proved quite satisfactory for this. It was also necessary to organize an army of over 20,000 men in order to secure in the timber lands of the Northwest the necessary supply of spruce.

In closing, Mr. Emmons paid a tribute to the earnest workers who by their untiring efforts in the shop, factory and office had made possible the wonderful production record on the world famous Liberty Motor.—*H. R. Jenney.*

ESSEX COUNTY ARTS ASSOCIATION.

The general meeting of the Essex County Arts Association was held at the Girls' Vocational School, Newark, New Jersey, March 17, 1920, at 4:30 p. m.

The annual election took place at this meeting when the following officers were chosen for the coming year:

President, Mr. Phillip Wagner, Cleveland Junior High School, Newark, N. J.

Vice-President, Mr. Edwin Judd, Montclair High School, Montclair, N. J.

Secretary-Treasurer, Mr. Max Henig, West Orange Vocational School, West Orange, N. J.

Miss Beulah A. Hurley of the New Jersey State Normal School, Newark, New Jersey, gave the association a most interesting account of her two years' experience in Europe with the Anglo-American Friends' Mission.

Following the meeting a hot cafeteria supper, prepared by the girls in the domestic science department was served. The dining room was made attractive with St. Patrick decoration arranged by the Art Department.—*A. D. B.*

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Mahogany Finish on Cherry.

40. Q:—Can cherry wood be finished to imitate mahogany?—*D. E. S.*

A:—Cherry should be treated to imitate mahogany preferably thru the use of two stain coats. For the first, dissolve two ounces of potassium dichromate in one gallon of hot water and keep in earthenware or glass. Apply to the finished cabinet work so as to freely cover all surfaces. When dried for twenty-four hours this will be found to have assumed a deep brown tone. For the red stain use two ounces of Bismark brown dissolved in one gallon of boiling vinegar. This Bismark stock should be tried out on a panel previously treated with dichromate solution in order to ascertain the suitability of the red tones of the Bismark solution. Let the panel dry after staining with the second solution and give a coat of orange shellac reduced quite thin with alcohol and judge the shade while the shellac is still wet. If too strong a tone the Bismark should be reduced to the proper amount with water in whatever proportion desired to lighten the shade. If still deeper tones are desired a very slight amount of acid aniline black should be added to the Bismark solution. In any case the stain coat should be followed by a reduced orange shellac which simply acts as a size coat in order that any raised grain may be sanded smooth previous to varnishing. The work should be finished with at least three coats of varnish, preferably four and should be rubbed perfectly level on the last two coats with FF pumice stone, felt pad and water and cleaned up in a good oil polish so as to leave a medium gloss. This treatment as outlined above has produced very handsome shades of mahogany since cherry is especially suitable to this class of finish.—*R. G. W.*

Basket Making.

43. Q:—Please tell me where I can purchase reed and metal cups for vases. I would also like to get books on basket making.—*W. C. S.*

A:—The following firms make metal products of this character: B. F. Drakenfeld Co., 50 Murray St., New York; Sons-Cunningham Reed & Rattan Co., 157 E. 32nd St., New York; Specialty Reed Works, Spartanburg, S. C.

The following books on basketry will be found helpful: *Blanchard's Basketry Book*, $2, Charles Scribner's Sons, New York; *White's How to Make Baskets*, $1, Milton Bradley Co., Springfield, Mass; *Marten's Inexpensive Basketry*, $0.30, Manual Arts Press, Peoria, Ill.; *Hasluck's Basket Work of All Kinds*, Cassell Co., New York; *James's Practical Basket Work*, G. W. James, Pasadena, Calif; *Tinsley's Practical and Artistic Basketry*, A. S. Barnes Co., New York; *Ashley's Raffia Basketry as a Fine Art*, $2.10, G. Ashley, Deerfield, Mass.; *Karlson's Elementary Basketry*, $0.75, Milton Bradley Co., Springfield, Mass.; *Webb's Basket Making*, $0.25, Milton Bradley Co., Springfield, Mass.; *Knapp's Raffia and Reed Weaving*, $0.50, Milton Bradley Co., Springfield, Mass.; *James's Indian Baskets and How to Make Baskets*, A. Flanagan Co., Chicago; *Gill's Practical Basketry*, David McKay, Philadelphia, Pa.; *Collier's Basket Making*, $1, Funk & Wagnalls Co., New York.

Silver Gray Wood Finish.

49. Q:—Will you please inform me thru your columns how to put a silver-gray finish on quartered oak and on walnut furniture?—*J. F. C.*

A:—Regarding the production of silver gray on quartered oak, I would say, that the shades of silver gray, pearl gray, and Kaiser gray were very popular four years ago but have quickly fallen into disuse because of the coldness and hardness of the shades in vogue. A room containing this furniture gave strong evidence of entire lack of warmth or friendliness in the color scheme and has been the cause of quick loss of favor with the buyers at the various furniture exhibitions at Grand Rapids and Jamestown.

Based on a new Universal Brown, I have worked out a charming shade of gray which offsets the coldness of previous shades on the market in that the rich brown tones of Universal Brown predominate and stand forth clearly beneath the gray overcast. This material and method of application will be furnished from the Waring-Bowerman Finish Products Company for $2.50 per pound, which will produce from five to ten gallons of stain depending upon the depth of tone desired.

A straight finish for the older shades of Kaiser or silver gray, can be made from the following formula:

One ounce of ferrous sulphate, one-half ounce of nigrosine jet black, three ounces of sodium sulphate, in one gallon of hot water. Apply thoroly to the wood and let dry over night before judging the shade. If satisfactory, it should be sized with a very thin coat of white shellac reduced with denatured alcohol; after which sand glass smooth. Make up a white paste of polishing wax, ground silex, and zinc white which is to be used as a filler and thoroly rubbed into the pores. It should be allowed to harden for one-half hour after applying and then polished to a clean, hard surface with a piece of clean Brussels carpet, or stiff bristle brush. Any shade of gray may be produced by diluting this water stain to any desired proportions.

The gray on walnut may be obtained by first staining the walnut with Universal Brown water stain to produce a rich even brown tone and when dry to be followed with a thin coat of orange shellac, reduced with alcohol by one-half. When hard, sand glass smooth and follow with the white filler and polishing as mentioned for the oak. This produces a more satisfactory gray than does the oak because of the inherently richer tones of the walnut.—*R. G. Waring.*

Bookbinding.

52. Q:—Where can I get books on bookbinding that will give me the information needed for one who is not experienced or had any of the work to begin with. I also wish to know where I can get materials.—*O. A. M.*

A:—*Bean's Bookbinding for Beginners*, $1.50, Davis Press, Worcester, Mass; *Vaughn's Bookbinding and Printing*, $1, Public School Publishing Co., Bloomington, Ill.; *Crane's Bookbinding for Amateurs*, $1.10, Inland Printer Co., New York, Chicago; *Adam's Practical Bookbinding*, $2.50, D. Van Nostrand Co., New York; *Pearce's Practical Bookbinding*, $0.50, Spon & Chamberlain, New York; *Halliday's Bookbinding as a Handwork Subject*, $1, E. P. Dutton & Co., New York; *Freeman's Syllabus of a Course in Elementary Bookbinding*, Teachers College, Columbia University, New York; *Worst's Industrial Work for the Middle Grades*, $3.50, Bruce Publishing Co.; *Cockerell's Bookbinding and the Care of Books*, $1.50, Manual Arts Press, Peoria, Ill.

Materials for bookbinding may be obtained from the following firms: Irving G. Banghart Co., Chicago; Slade, Hipp & Meloy, Chicago; Gaylord Bros., Syracuse, N. Y.; Gane Bros., Chicago; Moffitt & Rose, New York; Handy & Hamman, New York.

Pattern Making.

53. Q:—Please let me know if you have any publications on pattern making.—*L. J. S.*

A:—*Wilson's High School Course in Wood Pattern Making*, $0.80, M. E. Smith, Washington, D. C.; *Greene's Pattern Making Notebook*, $0.28, Manual Arts Press, Peoria, Ill.; *Purfield's Wood Pattern Making*, $1.88, Manual Arts Press, Peoria, Ill.; *McCracken & Sampson's Course in Pattern Making*, D. Van Nostrand Co., New York; *Barrows' Practical Pattern Making*, $2, N. W. Henley Co., New York; *Turner & Town's Wood Pattern Making*, $1, Manual Arts Press; *Ritchey's Pattern Making*, $1, American School of Correspondence, Chicago; *Chase's Art of Pattern Making*, $2.50, John Wiley & Sons, New York; *Willard's Pattern Making*, $1, Manual Arts Press, Peoria; *Crawshaw's Problems in Pattern Making*, $1, Manual Arts Press; *McKim's Art of Pattern Making*, $2.50, Manual Arts Press.

Springfield, Mass. The drafting department at the Technical High School has come into possession of an Emmert drafting machine. The machine saves time and labor and provides an outfit which enables the draftsman to make full-size drawings of almost any machine. An estimated saving in time of from 25 per cent to fifty per cent is claimed for the machine.

WESTERN ARTS ASSOCIATION TO MEET

PROGRAM ANNOUNCED.

The officers of the Western Arts Association have announced the preliminary program for the Detroit convention of the association which is to be held May 4, 5, 6, and 7. The headquarters for the convention will be in the Statler Hotel and the commercial and educational exhibits will be displayed in the auditorium of the Board of Commerce. The meetings will be held in the Statler and in the Board of Commerce rooms.

The sessions will be presided over by Mr. Harry E. Wood, Director of Manual Training at Indianapolis. The program is as follows:

OFFICERS.

President—Harry E. Wood, Director of Manual Training, Indianapolis, Ind.

Vice-President—Estelle Hayden, Supervisor of Art, Des Moines, Iowa.

Secretary-Treasurer—Louis R. Abbott, Director of Manual Training, Grand Rapids, Mich.

Chairman Local Committee—Alice Viola Guysi, Director of Art, Detroit, Michigan.

TUESDAY, MAY 4th, 8:00 P. M.—GENERAL SESSION.

Music and addresses of welcome.

Address by the President—Harry E. Wood, Indianapolis.

Address—"Training the Consumer", Rossiter Howard, Director Minneapolis Institute of Arts.

WEDNESDAY, MAY 5th, 9:00 A. M.—ART ROUND TABLE.

Chairman—Ruth Raymond, Assistant Professor of Art Education, University of Minnesota.

General Topic—A Unified Constructive Policy for Art Education in This Present Crisis.

Subject—"The Idealism of Adolescence", Lillian Cushman Brown.

Subject—"The Art of the Past for Inspiration, Not for Imitation", Rossiter Howard.

Subject—"Design and Industrial Education", Gertrude L. Carey.

Discussion.

WEDNESDAY, 11:00 A. M.—GENERAL SESSION.

Address—"Color Knowledge a Universal Necessity", Hugo B. Froehlich, Director of School of Art, Newark, N. J.

WEDNESDAY, 2:00 P. M.—PRINTING ROUND TABLE.

Chairman—Katherine Stilwell, Department of Printing, School of Education, University of Chicago.

Subject—"Organization and Plan of Printing Teachers' Association of Chicago", Laura Holmes, President of Printing Teachers' Association of Chicago.

Subject—"Rare Books", Mr. Deterer, Chicago Normal School.

Subject—"Typographical Layouts."

Discussion.

WEDNESDAY, 3:30 P. M.—HOUSEHOLD ARTS ROUND TABLE.

Chairman—Harriet M. Parkes, Assistant Director of Manual Training, Grand Rapids, Mich.

Subject—"The Art Element in Sewing Courses", Hugo B. Froehlich.

Additional subjects and speakers to be announced.

Discussion.

WEDNESDAY, 6:30 P. M.

Annual Dinner—Hotel Statler.

THURSDAY, MAY 6th, 9:30 A. M.—GENERAL SESSION.

Address—"Advertising and Selling Our Goods", C. Valentine Kirby, Director of Art Pittsburgh Public Schools.

Address—"Industry and the Creative in Education", Lillian Cushman Brown.

Address—"Balance in Composition", Rossiter Howard, Director Minneapolis Institute of Arts.

THURSDAY, 2:00 P. M.—MANUAL TRAINING ROUND TABLE.

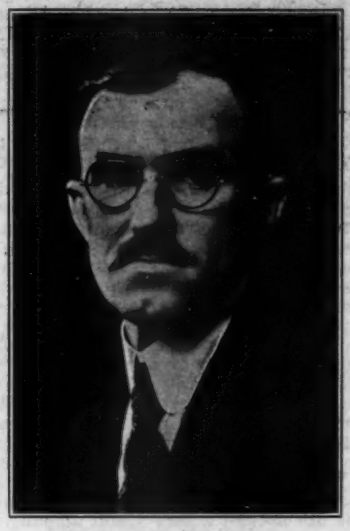
Chairman—R. A. Kissack, Director of Manual Arts, St. Louis, Mo.

Subject—"The Use of Jigs in the Manual Training Shop", Harold Gossett, School No. 8, Indianapolis, Indiana.

Subject—"Color and Design as Applied to Manual Training Problems", Hugo Froehlich, Fawcett School of Industrial Design, Newark, N. J.

Subject—"Manual Training in the Cosmopolitan High School", Matt J. Scherer, Cleveland High School, St. Louis, Mo.

Subject—"Industrial Design", H. M. Kurtzworth, Director The Grand Rapids School of Art and Industry.



MR. HARRY E. WOOD,
Director of Manual Training, Indianapolis, Ind. President of the Western Arts Association for 1919-1920.

THURSDAY, 3:30 P. M.—VOCATIONAL ROUND TABLE.

Chairman—James McKinney, Assistant Professor of Industrial Education, University of Illinois.

Address—Professor Meyers, University of Michigan.

Address—Miss Cleo Murtland, University of Michigan.

Address—Professor Arthur Payne, University of Minnesota.

Discussion.

THURSDAY, 8:00 P. M.—GENERAL SESSION.

Address—Gerrit A. Beneker, Artist, Hydraulic Pressed Steel Co., Cleveland, Ohio.

Reception at the Art Museum, 9:30 P. M.

FRIDAY, MAY 7th, 9:00 A. M.—GENERAL SESSION.

Address—"Art and the Community", Hugo B. Froehlich.

Address—"Taste in Design", Professor Grace A. Cornell, Teachers College Columbia University, New York.

Annual business meeting.

FOURTH ANNUAL MEETING OF THE VOCATIONAL AND ARTS ASSOCIATION OF NEW JERSEY.

The plans for the fourth annual meeting of the Vocational and Arts Association of New Jersey, to be held in New Brunswick, N. J., May 14 and 15, are being rapidly completed by Mr. Wm. R. Ward, President, and Miss Mabel Gaston, Chairman of the Program Committee.

The association will have the pleasure of listening to Dr. Frank V. Thompson, superintendent of schools, Boston, Mass., on "Industrial Education and the New Order." Dr. Frederick B. Robinson, dean of the College of the City of New York, will speak on "Vocational Training vs. Vocational Education." Dr. W. H. S. Demarest, president of Rutgers College; Dr. Calvin N. Kendall, State Commissioner of Education, and Hon. Peter F. Daley, judge of the Court of Common Pleas, will also address the teachers.

The Continuation School Law, which goes into effect July 1, 1920, has been given a prominent place on the general program. Mr. E. A. Reuther, who has charge of Continuation School work in the state, will outline the problem confronting the schools in providing continuation classes for employed boys and girls between 14 and 16 years. In addition, several chairmen of round table meetings have planned to place this subject on their programs. The round table meetings will be conducted by some of the best known teachers in their lines.

There will be a dinner, luncheon, a number of educational exhibits, and an opportunity to visit the new vocational school in New Brunswick. No effort is being spared to provide the best possible accommodations for these meetings.

Teachers who wish to attend the meetings and who are not members of the Association, are invited to write to Mr. James E. Gaffney, Secretary, Atlantic City, N. J., for a program and other information.